CLUNKERED

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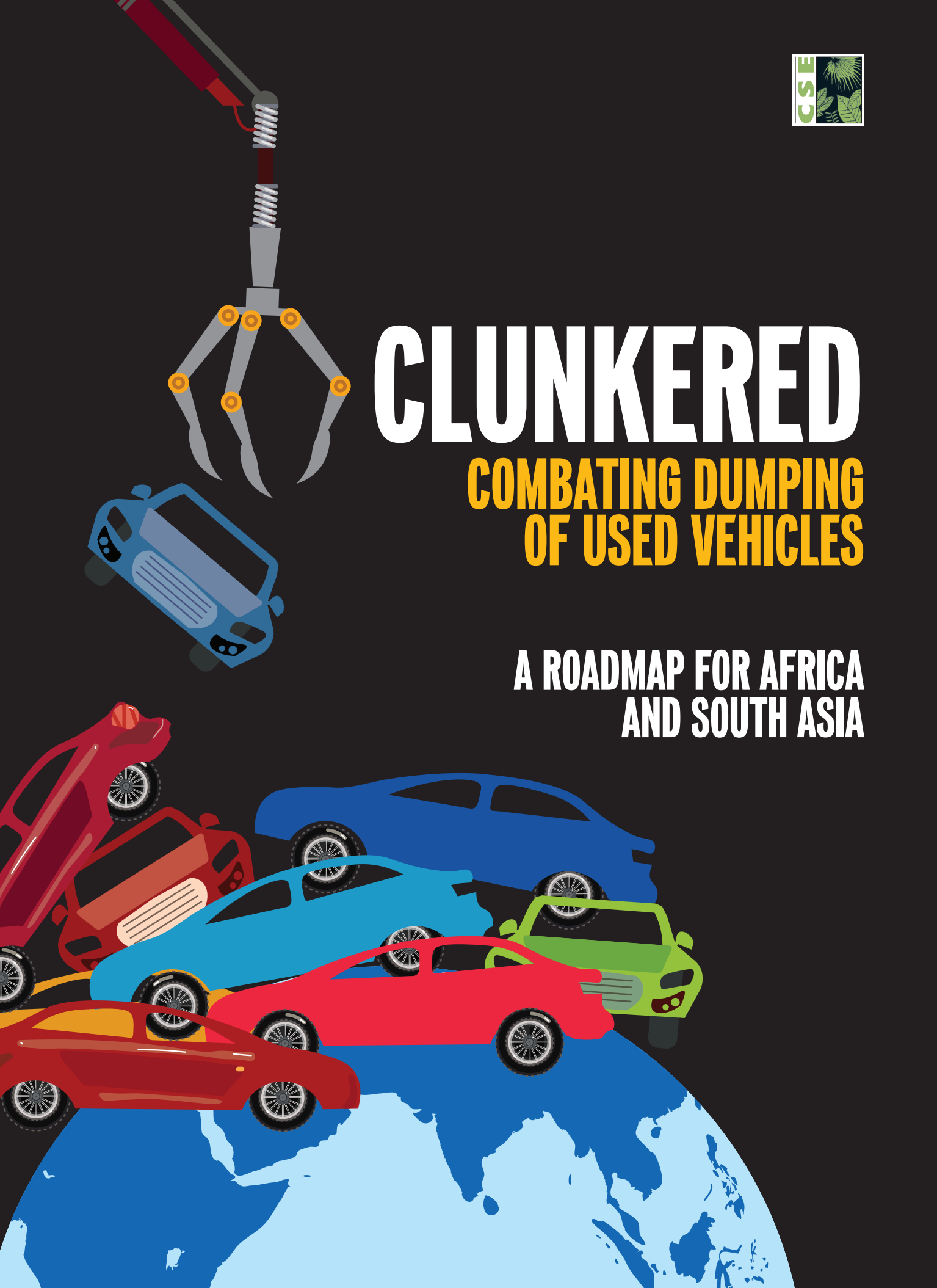
A ROADMAP FOR AFRICA AND SOUTH ASIA



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A ROADMAP FOR AFRICA AND SOUTH ASIA

Centre for Science and Environment

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We are grateful to the Swedish International Development Cooperation Agency (SIDA) for institutional support.

Maps in this report are indicative and not to scale.

Citation: Anumita Roychowdhury, 2018, *Clunkered: Combating Dumping of Used Vehicles—A Roadmap for Africa and South Asia*, Centre for Science and Environment, New Delhi.

Published by
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SECTION 1: Why this study?

Global motorization is rapid and explosive. As many as 2 billion vehicle tailpipes spew noxious pollutants and heat-trapping gases across the world. But as newer vehicles are inflating the global rolling stock every year, huge numbers are also becoming old and obsolete. In 2013, about 40 million vehicles a year were estimated to be approaching their end-of-life, representing 4 per cent of total global automobile ownership that needed to be scrapped.[1] The number of vehicles approaching their end-of-life will increase further as, according to the International Energy Agency, with growing economy and aspirations the global four-wheeler fleet is expected to double by 2050. Also, as the latent demand for cars is getting stimulated across the developing world, many old, used and close-to-being-scrapped vehicles are finding their way to low- and middle-income country markets, with serious public health consequences. Growing economy is also inflating the demand for freight and transport vehicles. Even in transitional economies, vehicles last longer than their economic life.

The concern around this continuous flow of discarded, old, used and cheap vehicles from high-income to low-income countries of Africa, Asia and Latin America remains neglected in the national and global strategies for air pollution control and climate mitigation. This is leading to an enormous pile-up of clunkers in importing markets that have very little wherewithal to address air pollution, climate and other environmental impacts. These countries are becoming scrap yards for old vehicles from advanced economies. While advanced economies have the capacity to deal with the accompanying problems of vehicles changing several hands within their domestic markets, poorer economies do not.

Low- and middle-income countries that do not have their own vehicle-manufacturing base and strong environmental safeguards are most vulnerable to the unregulated and uncontrolled import of used vehicles. But as the pressure is increasing to meet clean air standards as well as the Nationally Determined Contribution (INDC) commitments to reduce pollution and greenhouse gas emissions, developing countries are beginning to frame regulations to reduce vehicular emissions.[2] However, constraints of poorer economies, low level of affordability of consumers, lure of cheap vehicles, lack of clean automotive fuels and weak emissions regulations have created conditions and incentives for the trade of used vehicles and uncontrolled dumping.

This study has therefore become necessary to understand the imperatives of both the importing as well as exporting countries to find the possible solutions based on shared responsibility. It is clear that only unilateral action in vehicle-importing countries will not provide the full range of solutions. Equally, effective steps are needed in exporting countries to stop very old, used and damaged vehicles from entering the international trade. This will have to be further supported by stronger national regulations complemented by multilateral dialogue and action.

This essentially demands moving away from the conventional linear economy of production and disposal to a well-governed global circular economy around the use and disposal of vehicles. The system, while extracting maximum value of the products during use, must also recover and regenerate products and materials at the end-of-service life. But this will have to be integrated with the global value chain and supply chain with clear sets of shared responsibilities.

But this conversation is still weak. It is therefore important to explore the possibilities of integrating this agenda with the global multilateral platforms, free trade zones and other international forums and blocks.

To understand this better and inform the governments in importing countries of Africa and South Asia as well as to inform the global multilateral discussion on this matter, Centre for Science and Environment has carried out this comparative analysis of local imperatives and regulatory approaches to addressing used vehicle trade in Africa and South Asia that are most vulnerable to end-of-the-pipe trade.

This conversation within the global South has become important to enable learning from each other. While there is a common pattern in the different measures adopted with varying degrees of stringency—such as fixing the age for vehicle import, tax measures to make imports more expensive, linking emissions standards and requirement of electric mobility with import and improving their national emissions regulations—there are several local challenges and experiences that require deeper understanding.

Similarly, exporting countries that are tightening the noose around old and derelict vehicles within their domestic market through scrappage, end-of-life programmes and manufacturers' responsibility need to share responsibility to ensure that their domestic policies do not lead to mindless environmental dumping of clunkers in the low-income countries and they also frame policies to prevent entry of old and damaged vehicles from entering the international market.

For this assessment, periodic round-table discussions have been organized with the concerned regulators and stakeholders from different countries of Africa and South Asia to review the issues, status, draw a roadmap and gain local insight in a participatory manner (see *Annexure: CSE consultation on the issue of vehicle import*). Research on this matter is limited. In Africa, United Nation Environment Programme's (UNEP) Partnership for Clean Fuels and Vehicles has taken the lead to assess this problem. But the overall conversation on this matter in all vulnerable regions and among vehicle-exporting countries is still inadequate. This study hopes to inform and broaden the debate and deepen the action.

The key highlights of this study and findings are as follow.

How do clunkers flow? The direction of this trade typically flows from high-income countries to low-income countries, which have a higher demand for used and cheap vehicles. Cheaper cost, lower depreciation costs and richer variety of brands that are otherwise not available at affordable prices locally incite trade in used vehicles. Stronger emission-regulations for new as well as in-use vehicles in the high-income countries of Japan, US and Europe are responsible for higher turnover and renewal of their domestic fleet. This reduces the average age of vehicles in these countries and creates a huge stock of disposable used vehicles for trading. The direction of this intercontinental trade is largely towards Africa, Asia and several countries of Latin America.

Globally, it is not possible to estimate the actual quantum of used vehicle imports as data bases for used vehicles is not maintained separately. But studies exist to show that in countries of Africa 80–90 per cent of the imported vehicles are used and old vehicles. While most of the old and used cars are coming from the

US, Europe and Japan, the profile of the country of origin changes in the case of commercial vehicles and two-wheelers. Most commercial vehicles in Africa come from China, Japan and to some extent India, followed by other countries. Anecdotal evidence and information available from the national governments in Africa also suggest trucks and buses are comparatively of newer vintage than cars. Most two-wheelers are expected to be new vehicles and come largely from India and China. But within African countries there can be further trading of used vehicles.

South Asian market reflects another pattern where the trade flow is largely confined within the contiguous geographical region of Asia. India and Japan dominate this trade in South Asia. Thus, development in emissions regulations in the vehicle producing countries of Asia can have significant impact on upward harmonization of emissions regulations across the larger region.

Used vehicles can worsen public health risk: This discussion on used vehicle import has become important as air pollution and public health risk is increasing in South Asia and Africa. The 2016 database of the World Health Organization (WHO) on particulate pollution shows that South Asia is among the most polluted regions in the world. Other than the Maldives, all cities in this region have particulate levels that are significantly higher than the annual WHO PM10 guideline. The cities of Africa have also started to breach the WHO guidelines and in some cases by several times.

According to the newly released *The State of Global Air 2018* by Boston-based Health Effect Institute, the highest concentrations of population-weighted annual average particulate matter in 2016 were in countries in North Africa. Non-communicable diseases affected by air pollution are rising. This is expected to get worse with ageing of population, underlying disease conditions and wide prevalence of poverty. Over the past 25 years, health burden in low- and middle-income countries has increased for those aged 50–69 years—increasing, for example, by 24 per cent in India, from 9.1 million to 11.3 million life years lost. In South Asia, in addition to India, Bangladesh and Pakistan are most vulnerable.

This makes emissions from old and polluting vehicles a serious concern. They are adding hugely to toxic exposure as vehicles emit close to the breathing zone of people. Available and limited studies in some cities of Africa and South Asia show that vehicles are among the key sources of exposure. As most of the importing countries do not have clean automotive fuels or improved vehicle emissions standards with robust emission-inspection systems, visible toxic emissions are very high. A quick review of the global emissions factors for different generations of vehicle technologies show that old vehicles with uncontrolled emissions can emit 16 times more particulate matter and more than vehicles meeting Euro IV emissions standards. This leads to an enormous lock-in of pollution in the accumulating fleet of old and used vehicles.

Increased climate risk: Even though the level of overall heat-trapping CO_2 emissions in low- and middle-income countries is lower than the world average, vehicles are among the rapidly growing source. Old, ill-maintained and often malfunctioning vehicles that are getting dumped from the developed world become energy guzzlers and emit high amounts of heat-trapping gases. This cheap import also pushes the market towards bigger engines that undercut the fuel economy advantage of small vehicles that otherwise typically dominate several developing markets.

Most of these countries have made INDC commitments to reduce greenhouse gas emissions from the transport sector. But if the vulnerability to short-lived climate forcers like black carbon is considered, these regions are susceptible to rapidly rising diesel black carbon as well. This will get further aggravated by dumping of diesel vehicles that are being rapidly discarded from the advanced markets due to huge concerns around very high real-world emissions. Several countries in Europe have planned to phase out diesel cars. These discarded cars will eventually get dumped in the importing countries and add to the black carbon emissions. The International Panel on Climate Change (IPCC) has taken on board black carbon emissions as a short-lived climate forcer. The Working Group I contribution to the IPCC Fifth Assessment Report (AR5 WGI) has for the first time has included estimates of global warming potential of black carbon that is 900 times higher than CO_2 in a comparable timeframe of 100 years. The Climate and Clean Air Coalition (CCAC) is addressing this problem by promoting soot-free buses in Africa and Bangladesh. But such initiatives can be undermined if the risk from dumping of old diesel vehicles is not addressed. Countries like Nigeria have succeeded in controlling dieselization by pricing diesel fuel higher than petrol. Similarly, Sri Lanka has implemented a deliberate import and taxation policy to discourage import of diesel cars and promote cleaner hybrids, electric and petrol cars. But other countries may not be able to resist dieselization.

Weak environmental safeguards increase vulnerability: It is becoming increasingly difficult for vehicle-importing countries to control inflow of very old vehicles as most countries have not adopted clean fuel and vehicle standards. Even though Africa has seen good progress over time—with about 11 countries, including Morocco, Mauritius, Kenya, Uganda, Tanzania, Rwanda, Burundi, Ghana, Mozambique, Malawi and Zimbabwe having adopted 50 ppm sulphur fuels and a few more in the pipeline—the large part of Africa still has fuel with sulphur levels up to 2,500–10,000 ppm sulphur. While Morocco is the first country in Africa to adopt ultra-low sulphur (10 ppm fuel), Mauritius and East African countries have similar plans.[3] Without the fuel it is difficult to fix a lower age for vehicle import and fix emission standards at Euro IV levels for imported vehicles.

There are a few others who are poised to make the transition. Fuel quality is not uniform in South Asia. Ensuring uniform quality of fuel needs to be accelerated.

Even those who have fixed the age as well as introduced 50 ppm sulphur fuel, like Kenya, find it difficult to adopt commensurate Euro IV emission standards as availability of cheap and very old used vehicles undercuts such initiatives. Also, as is evident from the experience of several countries, there is a serious problem of inflow of very old vehicles through their porous borders. This therefore requires harmonized action across the African continent on age, fuel quality and emission standards.

Need for tighter regulations and checks on cheap imports have also become necessary in countries that are planning to build local manufacturing and assembly capacity. Countries like Nigeria that are deliberately developing the industrial policy to promote the automotive industry and assembly are more strident in imposing effectively high import taxes to lower import of vehicles and promote import of fully or semi-knocked-down kits for vehicle assembly in the country. This has created stronger incentives for regulating imports. The growing interest towards developing a local manufacture and assembly base

can deliver on its intended objective only if the new manufacturing is linked with at least Euro IV emission standards. This will also require appropriate fuel pricing to discourage dirtier fuels. Nigeria is a unique country that has priced petrol fuel much cheaper than diesel fuel, which has prevented dieselization of cars in Nigeria. It has also taken steps to ban import of polluting two-stroke engines. Such measures have helped avoid further increase in risks.

It is also not easy for most vehicle-importing countries to implement emissions-based imports as seen in the case of Mauritius, which was the first country in the region to implement the CO_2 levy/rebate scheme in July 2011. In July 2016, this scheme was suspended because it became increasingly difficult to verify the documents that made dubious claims about CO_2 emissions from old an used vehicles. As a result sale of used vehicles, despite their getting lower rebate, increased and exceeded new vehicle sale. The government started to lose revenue. It also became increasingly difficult to compare CO_2 standards from the different countries of origin. This also led to litigation. Thus, this programme had to be suspended and replaced with a tax system linked to engine size. Clearly, greater sophistication in regulatory tools in importing countries is often constrained by regulatory and technical capacity. This will have to be complemented by development of simpler methods of verification and monitoring as well as global harmonization of standards across markets. Emissions-based taxation, which is an important step forward in developing countries, needs to be enabled with global harmonization of emissions standards, test procedures and labelling programmes.

There is now considerable talk in several countries such as Mauritius, Ethiopia and Nigeria in Africa and Sri Lanka, Bhutan, Nepal and Myanmar to leverage import policies to promote electric mobility, especially in the para-transit and two-wheeler segments. This is an important opportunity that needs to be enabled to leapfrog. This may need to be evaluated in the context of energy access.

Also, as the experience of different countries show, only fiscal measures to make old-vehicle import more expensive does not work effectively. Even after loading them with higher taxes they still remain cheaper than the newer vehicles. Fiscal strategy will have to be combined with additional measures of eliminating the old fleet from the import stream and linking with improved emission standards.

Countries in South Asia on the other hand show a different trajectory. Unlike Africa, the international vehicle trade is largely confined to a geographically contiguous region and market of Asia. The countries of South Asia are largely importing vehicles from vehicle-producing countries within Asia, including India, Japan and China. Local regulations are strong drivers within these countries. Nepal and Bhutan have completely banned used-vehicle imports while Sri Lanka and Bangladesh have restricted import to three and five years respectively. Nepal has mandated Euro III emissions standards for all imports and is planning to graduate to Euro IV emissions standards very soon. Sri Lanka has further implemented tax measures very effectively to encourage cleaner technologies of hybrids, petrol and electric vehicles and discourage the use of diesel cars. With this they have effectively changed the market.

India, which is a major vehicle-producing country in South Asian region, has already banned import of used vehicles that do not meet the local emissions standards to protect its own vehicle industry. It has introduced Euro IV fuel

quality and emissions standards nation-wide in 2017 and is scheduled to implement 10 ppm sulphur fuels and Euro VI emissions standards nation-wide in 2020. This along with new developments in China open up a big opportunity in South Asia to make a quick shift to tighter emission standards. Upward regional harmonization is therefore critical to address this issue.

Given the wide gamut of challenges, current action in importing countries has limited impacts. It is toughest for these countries, especially in the Africa region, to impose an outright ban on import of old vehicles as consumer interest in cheap vehicles is very strong and often politically sensitive. Most of these countries also require appropriate technical and administrative capacity to have a system for verification of imported vehicles based on emissions and safety status of vehicles as well as to establish manufacturers' or dealers' responsibility. Mauritius has done that to some extent. This therefore requires participation of exporting countries to address the problem together. Common criteria will have to established for deciding the economic life of used vehicles that can be allowed for trading during the transition phase towards a total ban. It also needs consumer and public awareness.

Need strategy for recycling scrapped vehicles in importing countries: In the current linear process of produce, use and dispose, end-of-the pipe junk vehicles are rapidly accumulating in low-income vehicle-importing countries. After their use is maximized, they are abandoned or informally recycled for the secondary spare-parts market. There is a considerable thriving trend in used spare parts.

Governments in Africa and most of South Asia have not even begun to quantify the amount of scrapping that will be required in the years to come. In India, which does not import used vehicles but uses its own old vehicles more intensely, it is estimated that in 2015 over 20 million accumulated vehicles required scrapping or recycling. This is an enormous amount that can overstress the informal recycling and scrapping facilities in the country and burden the environment if more formal policies do not evolve to create appropriate infrastructure.

Most vehicle-importing countries have not even evaluated the magnitude of end-of-life vehicles that they will have to dispose of. This is significant and must be accounted for in planning. But this will also require an understanding of what obsolescence is in a used-vehicle market. Illustratively, India—a vehicle-producing country but being a poorer economy it uses up most of the lifespan of vehicles within the domestic market, with a small number of used vehicle flowing out to the neighbouring countries—has estimated obsolescence of vehicles that require final disposal. Surveys to estimate obsolescence rates of vehicles have shown that two-wheelers are likely to get obsolete at 10 years, followed by cars at 15 years, three-wheelers at 15 years, commercial passenger vehicles at 12 years and commercial goods vehicles at 11 years.[4] Thus, the lifespan of vehicles in developing country is much longer than in developed country.

Informal processing in South Asia and Africa is happening without any regulation and planning. As experienced in India, there is huge requirement of land for recycling and scrapping activities that most governments are not even planning for or cannot find. India has recently come up with a guidance document and is working on the scrappage and end-of-life regulations.
This is a lesson for importing countries in Africa and South Asia. In Africa,

informal scrappage of vehicles and recycling of scrapped material has started. Currently, there is uncoordinated recycling of iron and steel, aluminium, and plastic components of ELVs in Nigeria, for instance.[5] The informal waste collectors go to different mechanic workshops, collecting and buying disassembled and removed scrap components. They supply these scraps to the smelting companies. The materials in most cases are down cycled. But, as is also evident in South Asia, there is need for deliberate policy to first create incentives to ensure that adequate infrastructure has been created for scrapping and recycling. This also requires formal scrappage and end-of-life policies so that the requisite infrastructure can be created and formal financing is made available.

Also, as the vehicle-importing markets begin to improve their emission regulations and put harsher age caps on vehicle imports, better vehicle technologies will begin to penetrate these markets. As a result, the existing market in reuse of spare parts from the older vintage of vehicles will begin to get obsolete and will require the ultimate meltdown and recycling. As very old vintage vehicles cannot be passed on any further, they will need the final burial in these low-income countries.

Low- and middle-income importing countries will require support not only for infrastructure for end-of-life vehicles, but also to establish extended responsibilities of manufacturers and dealers to take care of the final disposal of the products as in developed world. But it has not been possible to figure out the mechanism for enabling this.

High-income importing countries are better prepared: It is a myth that only low- and middle-income countries import used vehicles. In fact, in rich countries like Australia and New Zealand, where vehicle manufacturing has not taken off for various local industrial and fiscal policies, vehicle-import dominates, including the import of used vehicles. But these countries have very tight age caps—as low as one year in Australia, with rigorous inspection and other requirements. These models can be referred to for the development of a protocol for the management of used-vehicle import.

Imperatives of exporting countries

Strong environmental safeguards in high-income countries retiring more vehicles: Increasingly, much larger numbers of used vehicles are likely to retire early or get pushed out before their useful economic life is exhausted in advanced markets as environmental regulations get tougher. Consulting firm Ricardo-AEAT estimated, based on vehicle scrappage rates, in 2015 that in the European Union (EU), 94 per cent of the cars have a second life, 87 per cent have a third life and about 27 per cent have a fourth life. A fourth life, however, is not common because of the scrappage rate.[6] A large number of older vehicles find their way to the international market. Experts have observed that international trade in used vehicles between high- and low-income countries work like 'substitute for an explicit "cash for clunkers" programme'. It lessens the number of vehicles that need to be scrapped in exporting countries.[7]

Periodic and expensive vehicle-inspection tests, such as the Shaken programme in Japan, incentivize people to replace vehicles faster. High disposable income leads to quicker consumer decision to replace vehicles. Several programmes that discourage old and polluting vehicles in city centres, phase out older diesel vehicles, or provide economic stimulus package to replace old cars are creating

a large pool of used vehicles not wanted within the high-income countries and are thus crowding in low- and middle-income countries.

Typically, in all advanced markets, legislative framework is emerging to scrap old vehicles and recycle end-of-life (ELV) vehicles. Once a vehicle is identified as ELV, it is de-registered, that is required to be scrapped and undergo recycling through appropriate processes within the country. Currently, ELV recycling systems exist in EU, Japan, Korea, China and Taiwan. The European Union, Japan and Korea have also adopted the extended producer responsibility principle, designed to recover used-car parts, scrap metal, batteries, etc.

Export of used vehicles lowers/avoids scrappage costs in advanced markets: Used-vehicle trade has created a stronger incentive for not implementing several end-of-life regulations for older vehicles within the domestic market of high-income countries. It is more lucrative and cost effective to export used vehicles than scrap them.

It is often observed that exporting countries may find it to their advantage to export old and used vehicles as it might be more cost effective than scrapping within their domestic market. Also the cost benefits of scrappage programmes are often doubtful. Some studies have established that the cash for clunker programmes in the US have not resulted in any significant economic savings or environmental benefits. However, there is value in estimating the recovery of material from the clunkers that can improve resource efficiency of the overall economy.

Moreover, scrappage programmes need to be properly designed to legally ensure that vehicles identified for scrappage are fully destroyed. Otherwise, the programme can have unintended consequences of encouraging the grey market in used-vehicle import. Anecdotal reports and media reports point towards illegal shipment of scrapped vehicles to Africa and Eastern Europe from Germany and other EU countries. This is because the German programme on scrapped vehicles requires that scrapped vehicles be sent to junkyards but does not legally require to provide proof that the scrapped vehicles are fully destroyed. This encourages illegal exports. In contrast, in the US, the cash-for-clunkers scheme requires dealers to destroy old engines and the ways to do so are also specified.

To this is added a long supply chain of vehicle trans-shipment to re-export hubs in the Middle East and elsewhere, where vehicles are stripped off of the advanced emissions control systems coming from advanced markets. The information on this is very vague and therefore it is difficult to assess the status of emission-control systems in imported vehicles. This has no oversight programme and is extra-jurisdictional and difficult to monitor. Large numbers of vehicles that get damaged in accidents or have manufacturing defects and been recalled in advanced markets are also exported out. Even in South Asia, a grey market has evolved around the porous borders through which sizeable numbers of used vehicles find their way to Nepal and Bangladesh.

No criteria for screening vehicles for export

As of now there are no clear and uniform criteria to classify grossly polluting and damaged vehicles based on age, mileage and vintage based on emission standards and remaining economic life of the vehicles that can be barred from export. It is important to make a distinction between old and polluting vehicles and used vehicles. As the 2017 UNEP assessment shows, advanced markets have high replacement rates and as a result substantial useful economic life

of vehicles remains—used vehicles are thus traded internally as well as are exported. There is, for example, a significant amount of trade in used vehicles within Europe and India.

It is not yet clear how the economic life of vehicles can be defined and fixed for the purpose of international trade. This is a relative concept associated with local income levels, usage patterns, and obsolescence rates linked to technical criteria of emissions and safety. In high-income countries, often vehicles are discarded much before the economic life is exhausted. For international trade therefore, uniform technical criteria are needed to define the minimum economic life that should be ensured before vehicles are allowed to be exported. If this is done along with improved fuel quality and emissions standards in importing countries, the benefits from younger recycled stock can be leveraged for better benefits. If exporting countries allow derelict and old vehicles to infiltrate markets, importing countries will find it harder to block them as consumer demands will sway towards cheaper vehicles and undercut all policy initiatives.

The way forward

Coordinated action based on shared responsibility is needed in vehicle importing as well as exporting countries to prevent dumping of clunkers in the poor world. The majority of the importing countries that are extending the life of vehicles much beyond their legally acceptable useful life are accumulating enormous clunkers. Countries will have to invest in huge capacities and preparedness to deal with the country's post-consumer waste. If the scope for recycling and reuse is not done properly it can impose huge systemic costs on the economy and environment.

Action in vehicle-importing countries

Need harmonized action on age caps, fiscal measures and other import criteria: When the capacity in most importing countries to technically assess the roadworthiness and emission performance of each imported vehicle is extremely weak, the most immediate and feasible strategy is to adopt an age cap to weed out extremely polluting, unsafe and uneconomical vehicles. A complete ban on used vehicles may not be possible in many importing countries immediately. But an age cap will allow use of a substantial part of the remaining useful economic life of the younger imported fleet while eliminating the highly polluting ones. But the ultimate objective should be to ban import of used vehicles. But well-established criteria will have to be adopted by exporting and importing countries to screen vehicles based on age, emissions and safety performance, history of accident, damage and recall.

So far only four countries in Africa and three countries in South Asia have succeeded in completely banning the import of used vehicles. As many as 25 countries in Africa and most in South Asia have imposed age restrictions. But age restriction is widely divergent—from three to 15 years. It needs to be harmonized to below three to five years. Divergent age caps create the scope of leakages through porous borders and re-export.

Moreover, the fiscal strategy of imposing higher tariff on older vehicles will have to be designed for effective reduction in import of old and polluting vehicles. It should not create perverse incentive for older vehicles over newer ones. Even after an ambitious hefty tax their price remains low compared to that of newer vehicles. Thus, eliminating very old vehicles from the market is critical to make fiscal measures work.

Countries will have to align their strategies. Harmonized action will help create bottom-up pressure on the international market and also plug leakages.

Harmonize emission standards and fuel quality at the minimum level of Euro IV with 50 ppm sulphur fuels: There is growing consensus among the regulators as well as multilateral agencies such as UNEP that for global trade in vehicles Euro IV equivalent should be minimum harmonized standards for both import and export. This by default eliminates all vehicles that are lesser than Euro IV from the export stream. It will also help to stabilize prices for the acceptable fleet in the international market and not undercut regulatory action in importing countries that are trying to establish an age cap as well as minimum emissions standards. Global exporters will have to follow the age cap and emission standards requirements for international trade and this will have to be multilaterally established for a harmonized approach. Importing countries cannot gain from regulatory restrictions on age to bring cleaner, younger and more fuel-efficient vehicles if fuel quality and emissions standards do not improve. Currently, the newer imported vehicles are stripped off the improved and advanced emissions control systems as requisite fuels are not available in most importing countries.

Eleven countries in Africa have adopted cleaner fuels (low sulphur 50 ppm). The countries include Morocco, Mauritius, Kenya, Uganda, Tanzania, Rwanda, Burundi, Ghana, Mozambique, Malawi and Zimbabwe. While Morocco is the first country in Africa to adopt ultra-low sulphur (10 ppm) fuel, Mauritius and East African countries have similar plans.[7] There are a few others who are poised to make the transition. Fuel quality is also not uniform in South Asia. Ensuring uniform quality of fuel needs to be accelerated.

Several countries in Africa and South Asia are also developing their own manufacturing and assembly capacity. Some countries such as Nigeria and Sri Lanka have already begun to adopt a restrictive import policy in terms of higher import tariffs to stave off influx of cheap and old vehicles. But this will also require emissions and safety standards and quality control for domestic production. Domestic regulations can then become the basis of import as is the practice in India.

Fuel economy measures need to be combined with improvement in emissions standards and fuel quality: This is needed to prevent trade-off between fuel efficiency and higher emissions. This is particularly important now as several exporting countries are phasing out diesel cars to combat air pollution. These are all likely to find their way to importing countries that do not have clean diesel. Countries like Mauritius that had implemented CO_2 emissions-based import without clean diesel and commensurate emission standards could have become vulnerable to a large influx of diesel vehicles. But this did not happen because of a very narrow gap between diesel and petrol prices, higher tax on bigger engines and consumer preference for petrol vehicles. But this may not be the case in other countries. The discarded diesel fleet will lock in toxic pollution and heat-trapping black carbon, and cause more illness in the developing world.

Implement inspection system for emissions, roadworthiness and safety in importing countries: Increasingly, several countries such as Uganda, Kenya, Nigeria, Sri Lanka and Bangladesh among others have begun to set-up vehicle inspection centres for on-road emission and roadworthiness tests. But this will

have to be organized at a different level—at the point of entry and subsequently periodically.

Need harmonized protocol for vehicle registration and verification systems: Regulation of import will require protocol for vehicle registration, and checking of authentic documents on emissions and safety status of vehicles to be obtained from dealers and sellers. It needs to record date of manufacturing, original emissions standards, export certification system, chassis details, fuel type, status of official emissions and safety inspection at the time of export, and other relevant detail based on a clear protocol. Centre for Science and Environment has reviewed the vehicle registration system in cities like Addis Ababa and Abuja and found that such details are not recorded.

The exporting countries will also have to maintain transparent and publicly available database on the emissions and safety and inspection status of vehicles. The entire dealership chain will have to be made accountable and responsible to follow the protocol. Importing countries may increasingly show interest in linking imports with emissions and fuel economy status of vehicles. Countries need explicit systems of oversight and monitoring as well as accountability of dealers. These systems should be developed further and replicated. Exporting countries have a role to play in addressing these challenges and creating transparent information for the supply chain.

Enable scrappage and end-of-life regulations and implementation in importing countries: Low- and middle-income countries will have to deal with the final disposal of the fleet as these vehicles cannot be reused or resold anywhere else. The costs of disposal and recycling rest on these countries and place enormous economic burden on them. Importing countries so far have not accounted for such costs. Moreover, the potential of recovering valuable material—an important part of a circular economy—remains underutilized.

This will have to be part of shared responsibilities. The importing companies as well as exporting governments through bilateral and multilateral arrangements need to create a mechanism to support scrapping and recycling in the low-income countries. This will require common set of criteria for the region to declare end-of-life of vehicles for recycling. Most countries in Africa and South Asia do not have adequate inspection system for road worthiness, emissions and safety. This often makes arbitrary cut off of age the decisive factor to scrap vehicles.

This sector will require legal support for end-of-life and dismantling and implementation procedure for de-registering a vehicle to qualify as an ELV and disposal. In India for instance, unless it is declared so, it cannot be traded as scrap according to the Motor Vehicles Act 1956 and successive amendments.[8] This poses an obstacle to the few formal recyclers in the ELV industry. Governments will have to develop a legislative framework, recycling infrastructure upgrading existing value chains, incentive structures to salvage reusable ELV parts, and effective collection and channelization mechanisms that leverage the informal sector. Dealers need to be an important link between consumers and manufacturers or consumers and dismantlers.

The used-vehicle market has its own demand for appropriate spare parts for the makes and models being imported. Even this trade will have to be organized more efficiently to service the entire value chain spread across continents. This

is volatile as renewal of the on-road fleet makes older spare parts obsolete. Manufacturers and dealers will have to maintain a critical mass of service components and spare parts in these markets.

Need consumer information and incentive for informed choice: Consumers in importing countries of Africa largely depend on the internet for purchase decisions. For instance, according to UNEP in Nigeria, internet-based sales account for 90 per cent of total purchases.[9] Several trade websites have mushroomed but are not certified by the governments. It is difficult to find websites that sell certified used vehicles or official websites that give out credible information status of certification, safety, road worthiness, emissions and fuel economy in exporting countries.

For informed consumer choices access to public available databases must be ensured. Advanced countries, for instance, have web-based consumer information systems for consumers. The US EPA's Green Vehicle Guide provides detailed user-friendly information about green vehicles.[10] Its 'SmartWay vehicle' or vehicle fuel economy labels provide information on fuel economy, fuel costs and environmental impacts. This includes information on energy impact score, GHG score, EPA smog rating and safety-related information like Crash Test Results etc. The US government's National Motor Vehicle Title Information System (NMVTIS)[11] is designed to protect consumers from fraud and unsafe vehicles and to keep stolen vehicles from being resold. The Federal Trade Commission's (FTC) Used Car Rule requires dealers to display a Buyers Guide in every used car they offer for sale, and to give it to buyers after the sale.

Websites in Japan approved by the Japan government's Ministry of Economy Trade and Industry—such as the Japan Used Motor Vehicle Exporters Association[12]—provide approved information from Japanese automakers. They provide details necessary to buy a vehicle, including emissions, fuel economy and safety as well as other details.

In Europe, the New Car Assessment Programme (NCAP) is a vehicle-safety rating system. This safety rating is determined from a series of vehicle tests, designed and carried out by Euro NCAP. These tests represent, in a simplified way, important real-life accident scenarios that could result in injured or killed car occupants or other road users.

The challenge is to find a global mechanism for integrating these databases to inform the global supply chain and further integrate such databases with the protocol of vehicle registration for export and import.

Promote shared responsibility of the exporting countries to filter out old and damaged vehicles from export: Action on used and old vehicle trade cannot be addressed only with unilateral measures in importing countries. The trade pressure from exporting countries can be intense and if these countries are not made accountable and responsible for the circular economy. As more and more importing countries begin to put barriers to trade in used vehicles, the export will also fall drastically. For instance, in the US, they found that countries that have preventive barriers to used vehicle imports were associated with 67 per cent fewer US exports to that country.[13] Emissions in importing countries can be hugely avoided if these vehicles are scrapped rather than exported. The emissions caused by these vehicles are higher when they have had little maintenance and belong to larger engines and higher weight categories.[14]

Need stringent measures in exporting countries for verification of vehicles for safety, emissions and road worthiness: Currently there is little incentive in exporting countries to have foolproof and robust systems to intercept all end-of-life vehicles, vehicles with compromised safety and emissions performance or accident-affected vehicles to stop them from entering the international market. Strong exit rules are needed to verify, inspect, certify and codify in a transparent manner any vehicle before it is exported. That the vehicle and chassis identification number are not tampered with must be ensured. All end-of-life vehicles, damaged vehicles and vehicles with compromised emissions and safety features need to be barred from export.

There must be an online database for verification by the importing countries, dealers and consumers. It is important to establish through a multilateral process the essential documents that all exporters and importers will have to display during exit, entry and registration. Anecdotal reports suggest that during the entire process of transshipment, there is considerable stripping of vehicles in re-exporting zones in the Middle East and elsewhere to take out the advanced emissions-control systems that are not appropriate for the importing countries which do not have appropriate fuels. It is not known what happens to the safety gears in the vehicles. There is also no clarity on how this supply chain should be monitored. Monitoring the supply chain is needed to assess the status of safety gadgets in the vehicle. The dealer's chain will have to be made accountable.

Need accountability and adaptation of Extended Producer Responsibility for global supply chain: How can the approach of establishing manufacturers' and dealers' responsibility and Extended Producer Responsibility (EPR) that makes the manufacturer or importer of vehicles responsible for the entire life cycle of the product work in vehicle-importing countries? The EPR strategy has been adopted by high-income countries where manufacturers are required to reduce the overall environmental footprint of their products by reducing the use of toxic and hazardous substances; by increasing the use of recycled constituents; and enhancing the ease of disassembly among others.[15] The producers also have to provide for the take back, recycling and final disposal of the product, within the domestic economy.[16]

How can this idea be taken forward for the importing countries? Of course, this will have to be read with the rider that this should not work as extra jurisdictional reach of other governments and undermine sovereignty. But there has to be a global mechanism to identify the responsibility and participation of stakeholders including consumers, producers, recyclers, dealers, in the global supply chain. There is useful experience in Mauritius in the way they have established the procedure for warranty and guarantee with the suppliers as well as certification agencies in the country of origin. This will have to be resolved through intergovernmental consultation. The way producers are establishing collection and recycling facilities in their respective domains similar efforts will have to be made as part of shared responsibility in the importing countries.

Thus, governments through a bilateral and multilateral process, and manufacturers and dealers will have to support establishment systems for monitoring on-road performance and end-of-life and recycling facilities in importing countries.

Leveraging multilateral forums to govern international trade in used vehicles
Mitigation of this problem through shared responsibility is important as for a considerable part of the life span of the vehicles produced in high income countries continue to emit in low income countries. There is no clear multilateral forum that has explicitly taken this issue on board. Even though there is global concern over 'environmental dumping' of high-polluting vehicles to the least well-off economies, there is no clear template to define and address the problem. The question and solution are still exploratory.

Leveraging trade forums: Literature hints at discussions on used vehicle import in the World Trade Organization (WTO). This is evident from the review carried out by the Global Fuel Economy Initiative in 2013 in the context of import of used vehicles to Mexico from the US.[17] This has highlighted that though several countries have already put up import barriers to used vehicles without any significant opposition to such measures or attempt to block such measures in the WTO.

The grounds for discrimination against the importation of second-hand vehicles given particularly by Latin American countries have included safety and environmental concerns, and problems with valuation and protection against fraud and corruption. Colombia has cited Article XX (b) of GATT 1994, which allows general exceptions for countries to accomplish 'non-economic' objectives including the safety and health of human, plant and animal life. To justify domestic protectionist policies in WTO, Brazil has cited customs valuation concerns and the potential for fraud, and 'negative impacts for the environment and public safety arising from the commercialization of used consumer goods in the domestic market'.[18] Brazil has also pointed out that such policies were common to many WTO members and bans should not be considered as distorting trade.

India has fought used-vehicle import very hard during 2007–09 to protect its own industry and has its policy to ban such import and make it a legal requirement that all imported vehicles meet the current emissions standard in force in India.

However, as the experience of Mexico has shown, importing countries can come under pressure in free trade zones such as NAFTA where a unilateral decision to impose an age-based ban may become difficult. After signing NAFTA, Mexico had gone for a policy reversal in which 10–fifteen-year-old vehicles from US and Canada were allowed once again to the detriment of the environment. Thus, a roadmap for circular economy will have to be included in all trade negotiations.

Multilateral environmental forums: Multilateral environmental forums on climate change such as UNFCCC need to explore the possibility of facilitating dialogue and decisions on the framework that should govern used-vehicle trade. The Partnership for Clean Fuels and Vehicles (PCFV) of the UNEP is currently evaluating used-vehicle trade to chart the roadmap for action. It may be taken forward to influence multilateral strategies and national policies to set the terms of global trade. This trade has huge implications for climate impacts as old vehicles with highly inefficient engines and malfunction incite energy guzzling and lock in CO_2 and black carbon. Moreover, cheap used vehicles allow the market to shift steadily towards bigger vehicles that undermines the inherent advantage of the small-car market of South Asia and Africa.

International cooperation: Yet another platform that needs to be explored and leveraged is the international forums and blocks of governments. Some international forums such the G8, G20 and BASIC have begun to place the sustainability agenda on the table as well as the importance of integrating the framework of the circular economy for the security of supply of resources and environmental sustainability.

The G20 for example is more explicit in its discussions. It has started the discussion on developing frameworks to enhance circular economy, sustainable production and consumption. Circular economy is now getting linked with the 2030 Agenda for Sustainable Development and the Paris Agreement. It is expected to bring more transparency across global supply chains and facilitate financing for establishing circular supply chains.[19] A policy brief of the G20 group states that G20 governments should support transparency across global supply chains regarding the origins and content of circular products and materials by supporting development of standards and labels as part of 'sharing economy' or 'collaborative economy'. It states that countries require agreed common framework of indicators to monitor the performance of countries and companies worldwide[20] to respect resource-efficient principles. This requires knowledge sharing among countries to ensure circular trading in goods that are not hazardous.[21] Multilateral platforms can develop a common framework of indicators to monitor the circular economy performance of companies worldwide and look at performance and life expectancy of products as the original ones.

Such discussions create the opportunity for including used vehicles in the trade and multilateral negotiations on circular and hazardous trade.

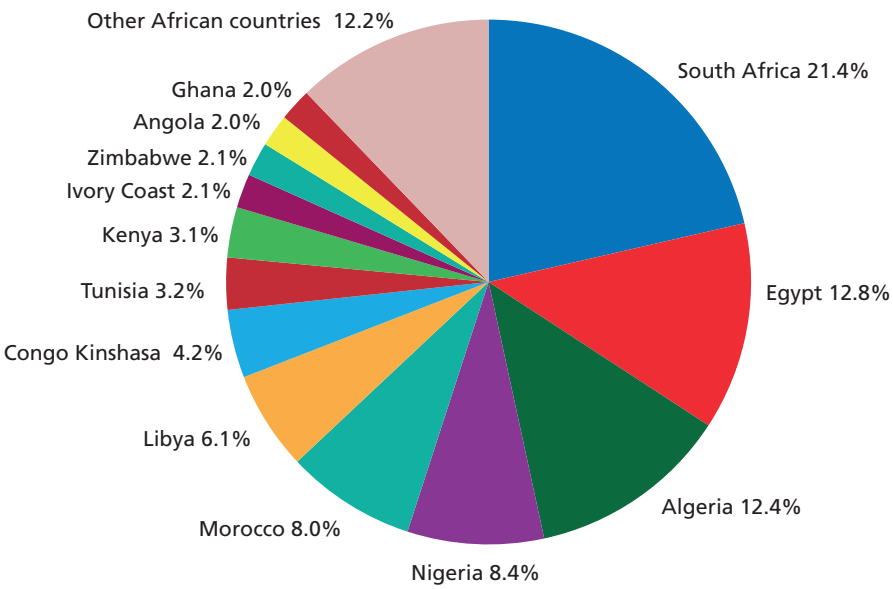
Involve manufacturers and dealers: Manufacturers and dealers are involved in global supply chains. These complex chains need transparency regarding the origin and content of circular products and materials and collaboration among different industries along the supply chains. Governments can support the development of labelling and declaration of content of products and materials and ensure resource-efficient supply chains. In Europe, companies such as Volvo, Toyota and Volkswagen as well as others have started to take the responsibility for the final disposal of their products. It will be worth exploring how manufacturers or their franchisee or dealers can replicate such systems globally.

SECTION 2: Motorization riding high on used-vehicle import

Motorization in Africa

Motorization in Africa is in its early stages of growth and the baseline stock is still much lower than that in rapidly growing developing countries. According to Deloitte's 2016 *Africa Automotive Insights* report, there are 42.5 million vehicles in use in Africa in 2014. This has increased to 45 million as per International Organization of Motor Vehicle Manufacturers (OICA) 2015 data. South Africa has the highest share with 21.4 per cent, followed by Egypt with 12.8 per cent, Algeria with 12.4 per cent and Nigeria with 8.4 per cent (see *Graph 1: Vehicles in use in Africa, 2015*).

Graph 1: Vehicles in use in Africa, 2015

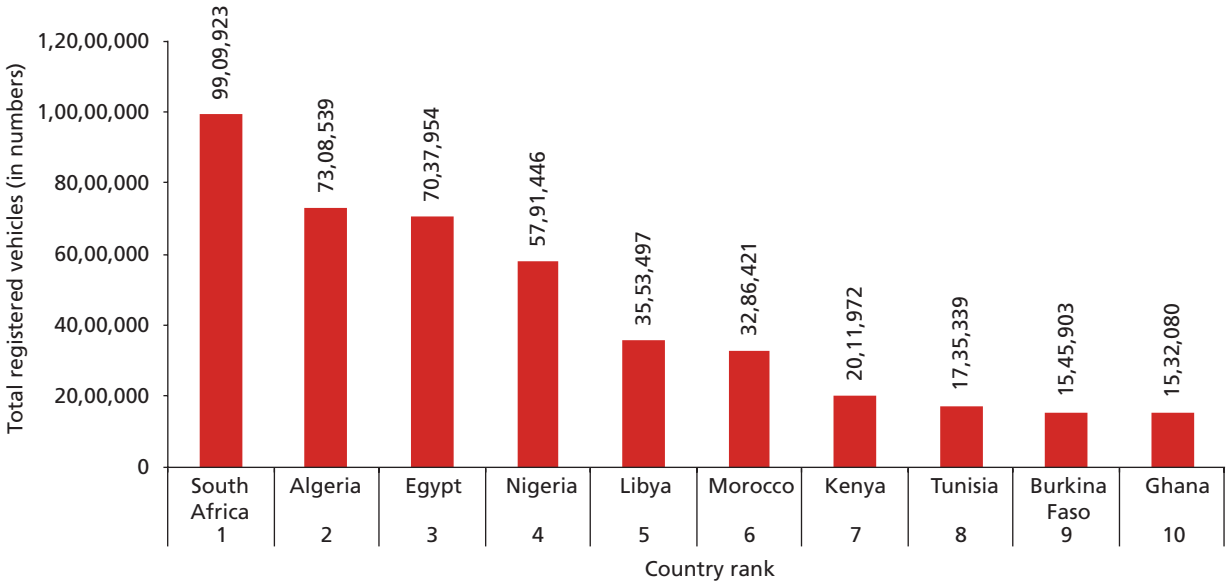


Source: Computed by Centre for Science and Environment from International Organization of Motor Vehicle Manufacturers (OICA) 2015.

A 2014 World Bank estimate shows that the vehicle ownership rate in Africa is still much lower than the world average and that in high-income countries. In 2012, the only countries exceeding 50 cars per 1000 people included South Africa, Botswana, Mauritius and Namibia. According to OICA, vehicle ownership is expected to increase by 31 per cent.[1] OICA, 2015 data shows increasing vehicle ownership in a few countries, including Libya, Mauritius, South Africa and Botswana (see *Graph 2: Top ten African countries with total number of registered vehicles* and Graph 3: *Vehicles per thousand in different countries of Africa*).[2]

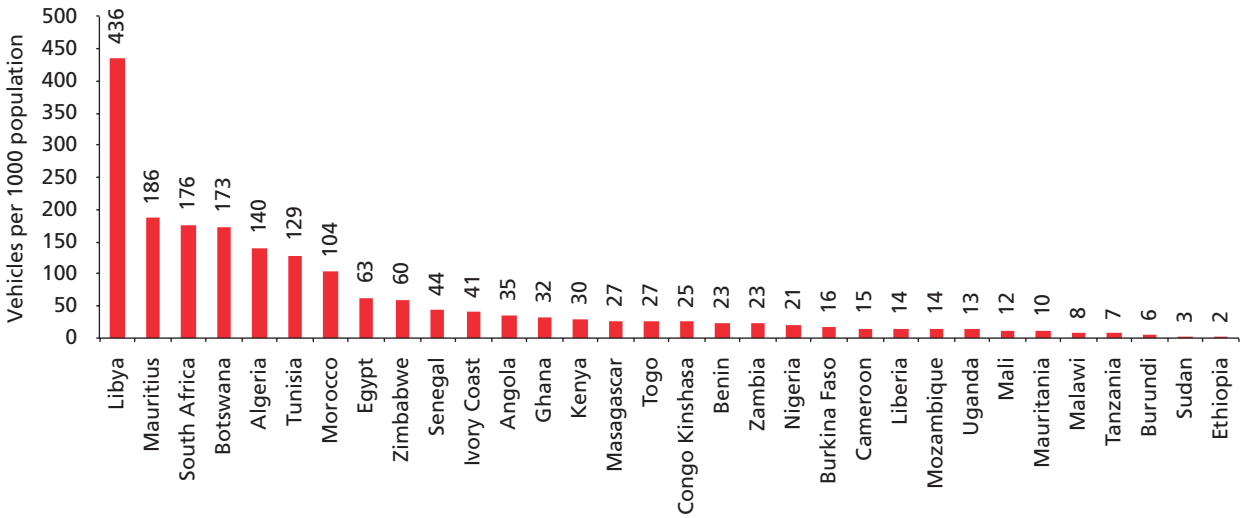
Key urban centres are witnessing rapid increase. In Kenya, where nearly 30 per cent of all vehicles in the country are in its capital city Nairobi alone, the car fleet is estimated to double in just six years.[3] In Lagos, Nigeria, it is estimated that if the ownership rates grow from 0.05 to 0.06 per capita in 2010–25, there will be an 80 per cent increase in vehicle numbers.[4] In Ethiopia's capital Addis Ababa, even if the base numbers are small the fleet has increased by 6.6 per cent in 2015 as compared to 2014.[5]

Graph 2: Top ten African countries with total number of registered vehicles



Source: WHO, 2013

Graph 3: Vehicles per thousand in different countries of Africa



Source: Anon. 2015, Vehicles in-use 2015 data, International Organization of Motor Vehicle Manufacturers (OICA).

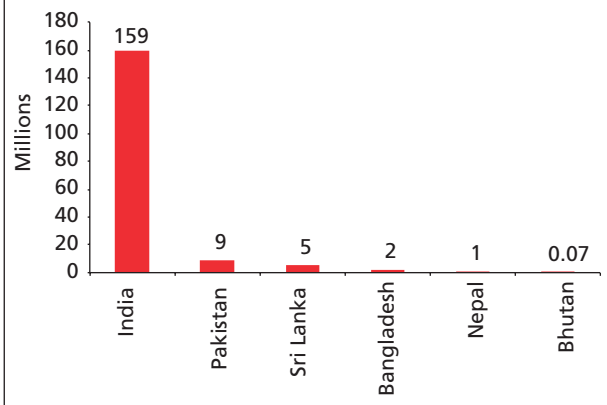
Without its own well-established vehicle-manufacturing base, Africa has become hugely dependent on vehicle imports. South Africa has some manufacturing base while Nigeria and Ethiopia are setting up their assembly capacity.

Motorization in South Asia

South Asia is also motorizing rapidly. India is the largest and most populous country in South Asia; in terms of absolute numbers the total registered vehicles surpasses that in all other countries. But in relation to the respective population size, the vehicle density is already high in other countries of South Asia (see *Graph 4: Total registered vehicles and vehicles per thousand in countries of*

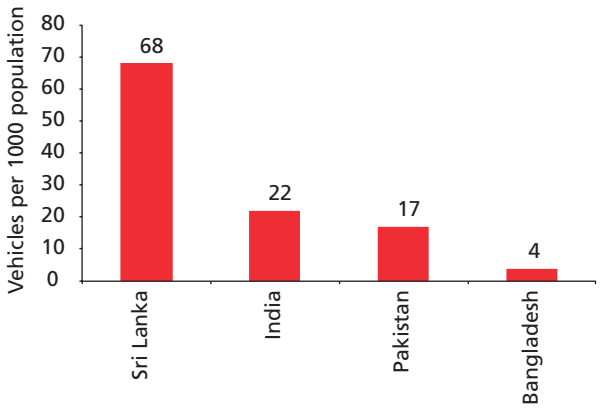
Graph 4: Total registered vehicles and vehicles per thousand in countries of South Asia

Number of registered vehicles in South Asian countries



Source: WHO 2015, Global Health Observatory data repository, registered vehicles data by country, http://apps.who.int/gho/data/node.main.A995

Vehicles per thousand population



Anon. 2015, Vehicles in-use 2015 data, International Organization of Motor Vehicle Manufacturers (OICA).

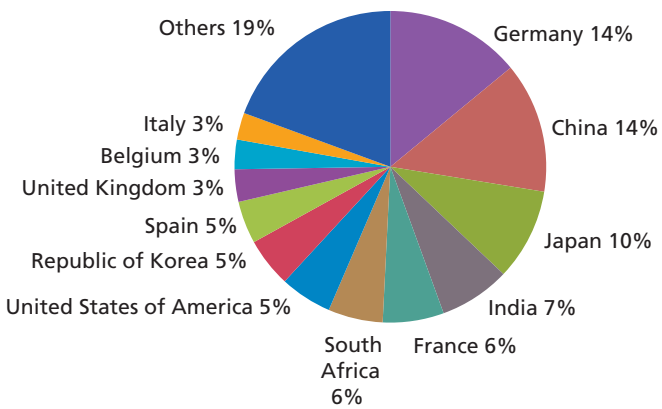
South Asia). Sri Lanka has the highest car density, with close to 70 vehicles per thousand people, which is higher than India's at 22 per 1000 people. It has witnessed an 84 per cent growth in private vehicles in 2007–17. The increase in number of private vehicles will continue at 2.5 per cent annually. The share of public transport is predicted to decrease continuously from 55 per cent to below 50 per cent by 2030. Average travel speed is expected to drop from 17 km/hr to 12 km/hr.[6] This is turning out to be a common trend across South Asia.

Where are vehicles coming from?

Imports to Africa

To understand the overall trade flows and direction of trade, it may be useful to analyse data on the value of international trade reported by the International Trade Centre statistics of the World Trade Organization. This indicates the value of the trade, not the quantum. It also does not distinguish between old and new vehicles. The aggregated value of international trade in vehicle for 2017 shows that vehicles came to Africa from over 17 countries (see *Graph 5: Share of exporting countries in total vehicle import to Africa*). If total vehicle import is considered, Germany, China and Japan are the biggest exporters to Africa.

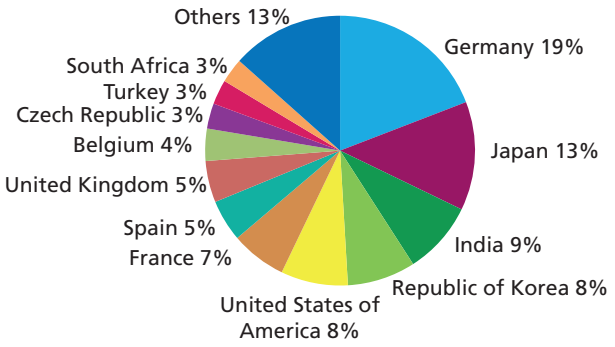
Graph 5: Share of exporting countries in total vehicle import to Africa (% of value of import)



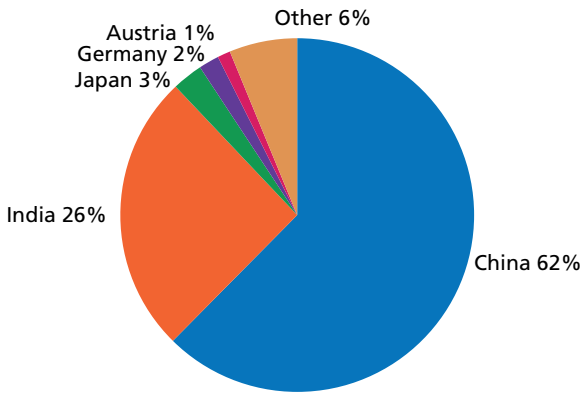
Source: Computed by Centre for Science and Environment from International Trade Centre statistics, 2017. International Trade Centre UNCTAD/WTO, 1994-2017, http://www.intracen.org/default.aspx

Graph 6: Share of exporting countries in vehicle segment-wise import to Africa (% of value of import)

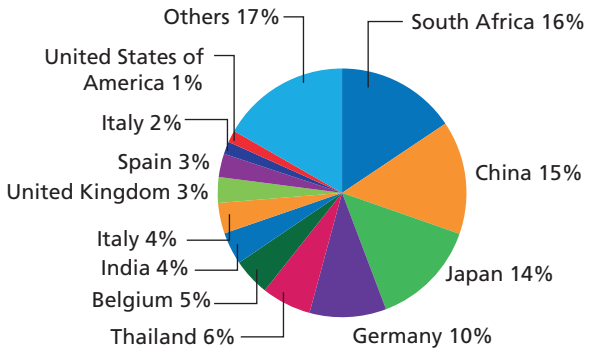
Car imports in Africa in 2017 (% of value of import)



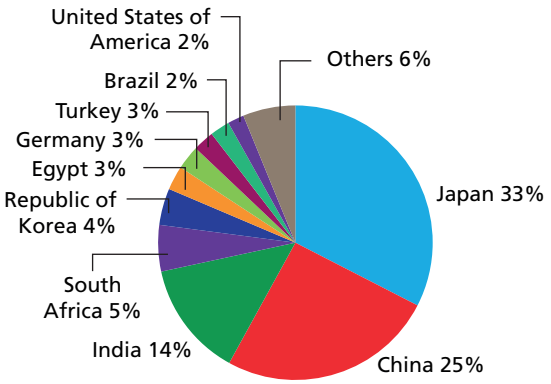
Two-wheeler imports in Africa in 2017 (% of value of import)



Goods-vehicle imports to Africa in 2017 (% of value of import)



Public-transport vehicle imports to Africa in 2017 (% of import)



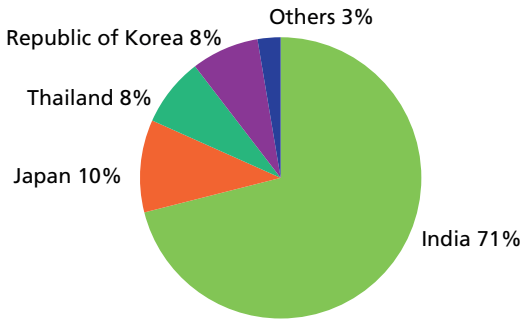
Source: Computed by Centre for Science and Environment from International Trade Centre statistics, 2017. International Trade Centre UNCTAD/WTO, 1994-2017, http://www.intracen.org/default.aspx

Direction of trade changes depending on the vehicle segments as well (see *Graph 6: Share of exporting countries in vehicle segment-wise import to Africa*).[7] The maximum cars come from Germany, Japan, India, Korea and the US (see *first graph in Graph 6*). While most of the cars come from the high-income countries, the share of China and India increases in import of commercial vehicles and two-wheelers. Most motorized two-wheeled vehicles are from China (62 per cent) and India (26 per cent).

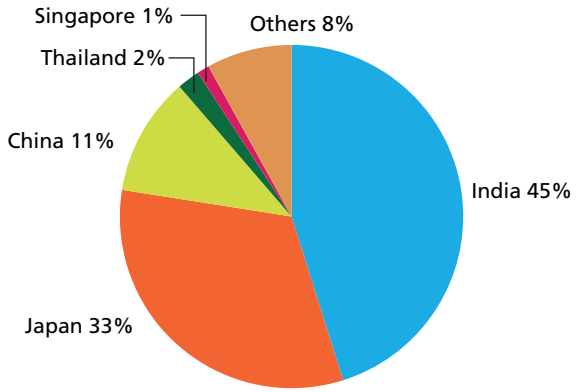
Japan, South Africa and China dominate import of goods vehicles in the region. In the public-transport segment, the highest share is that of Japan at 33 per cent, followed by China at 25 per cent and India at 14 per cent. Public-transport vehicles are those that can accommodate over 10 people. Smaller ones are popular largely as para-transit vehicles in the informal sector that meet considerable travel demand.

Graph 7: Where are the vehicles are coming from in South Asian countries?

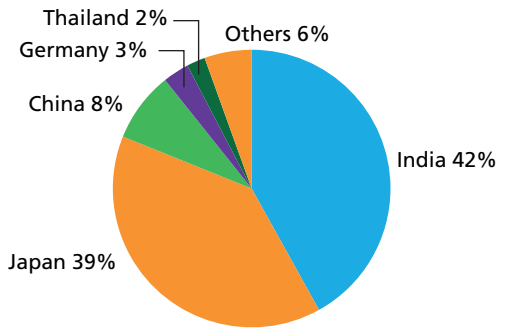
Total vehicle imports in Bhutan in 2012 (% of value of import)



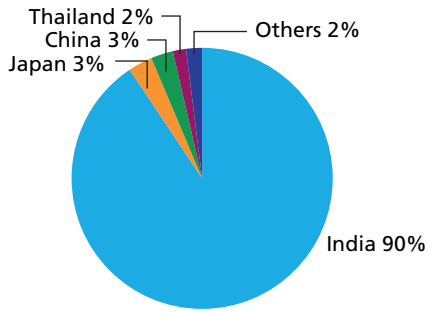
Total vehicle imports in Bangladesh in 2015 (% of value of import)



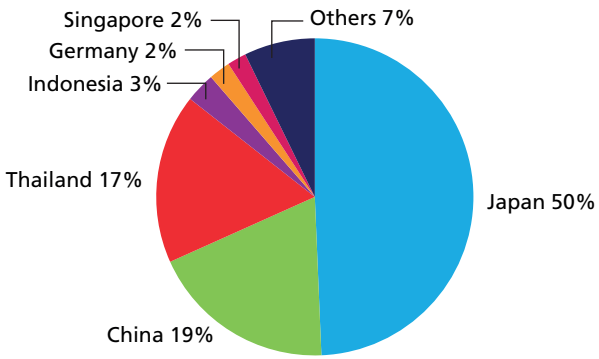
Total vehicle imports in Sri Lanka in 2016 (% of value of import)



Total vehicle imports in Nepal in 2015 (% of value of import)



Total vehicle imports in Pakistan in 2016 (% of value of import)



Source: Computed by Centre for Science and Environment from International Trade Centre statistics. International Trade Centre UNCTAD/ WTO, 1994-2017, http://www.intracen.org/default.aspx

Imports to South Asia

Vehicle-importing countries of South Asia show a very distinct trend from Africa. It is dominated by vehicle flow within contiguous regions (see *Graph 7: Where are the vehicles are coming from in South Asian countries?*).

If total vehicle imports in five importing countries in South Asia are considered (Bhutan, Bangladesh, Nepal, Pakistan and Sri Lanka), the biggest exporters are vehicle-producing countries in Asia at closer geographical proximity, which includes India, Japan and China. This region does not attract long-distance intercontinental trade in vehicles. In Bhutan and Nepal, import is predominantly from India—71 per cent of the value of import in Bhutan and 90

per cent in Nepal. In Bangladesh and Sri Lanka, India's share in import is about 45 to 42 per cent respectively. In Bangladesh, the share of Japan is significant at 33 per cent and in Sri Lanka 39 per cent. In Pakistan, on the other hand, half of import value is from Japan, followed by China at 19 per cent and Thailand at 17 per cent. The rest of the share in South Asia is shared by Thailand, Korea, Singapore and Indonesia. A minuscule amount comes from Germany.

Among these five countries, there is further variation in the relative share of countries of origin depending on vehicle segments (see *Graph 8: Share of exporting countries in segment-wise import of vehicles to South Asia*).

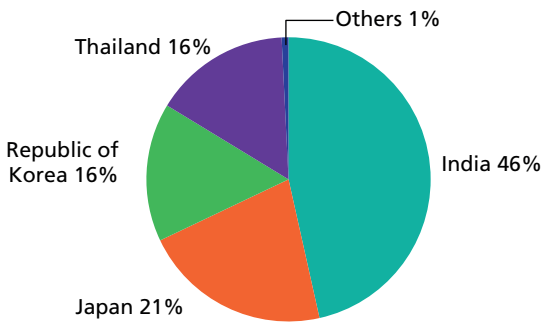
In Bhutan, for which the latest available data is for 2012, cars are seen to come from a much wider spectrum of countries than other countries. About 46 per cent of cars come from India, followed by 21 per cent from Japan and 16 per cent each from Korea and Thailand. But in the case of two-wheelers, 91 per cent are from India. However, 54 per cent of public-transport vehicles are from China and 39 per cent from India. But 100 per cent of goods vehicles are from India. Similarly, import from India dominates vehicle import into Nepal. In 2015, 82 per cent of cars, 97 per cent of two-wheelers, 91 per cent of goods

Graph 8: Share of exporting countries in segment-wise import of vehicles to South Asia

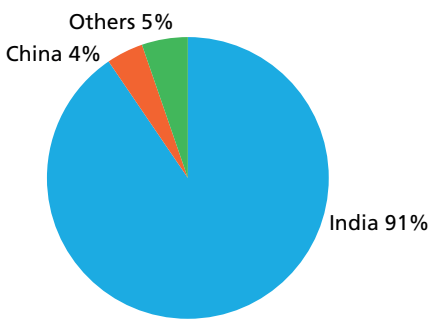
i. Bhutan in 2012

Segment-wise import of vehicles in Bhutan in 2012

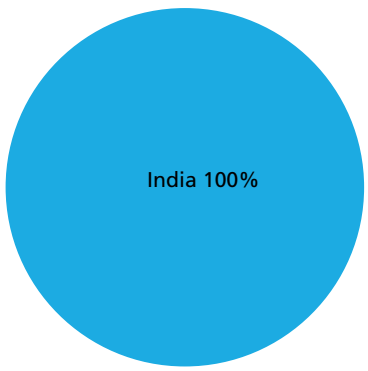
Car imports in Bhutan (2012) (% of value of import)



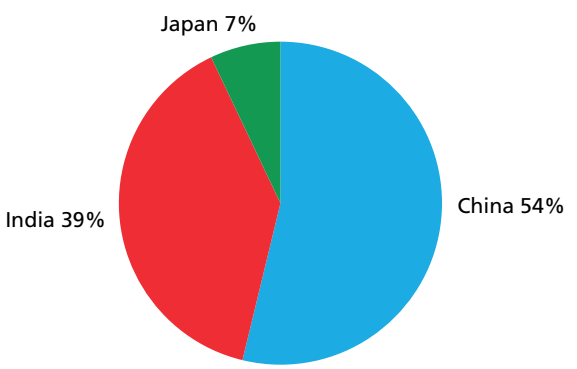
Two-wheeler imports in Bhutan in 2012 (% of value of import)



Goods-vehicle imports to Bhutan in 2012 (% of value of import)



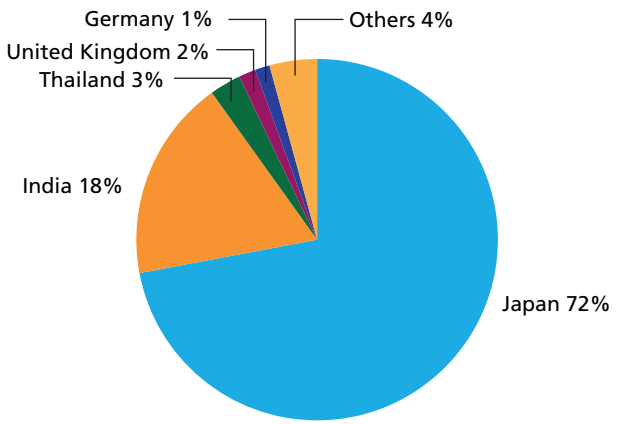
Public-transport-vehicle imports to Bhutan in 2012 (% of import)



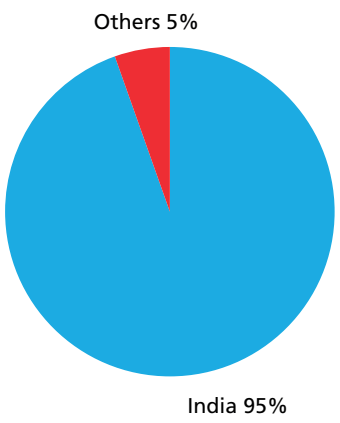
Source: Computed by Centre for Science and Environment from International Trade Centre statistics, 2012.

ii. Bangladesh (2015)

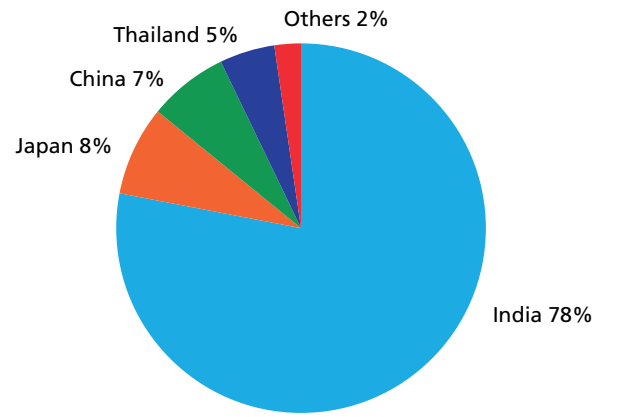
Car imports in Bangladesh in 2015 (% of value of import)



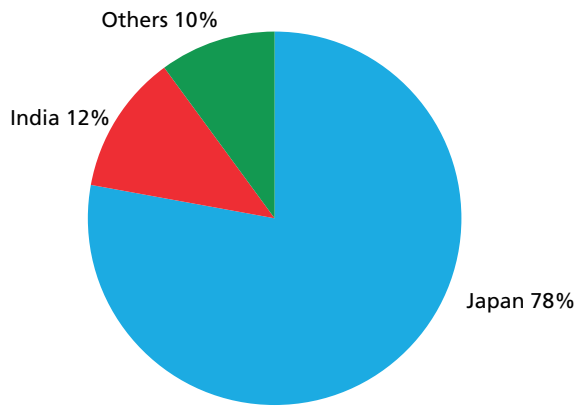
Two-wheeler imports in Bangladesh in 2015 (% of value of import)



Goods-vehicle imports to Bangladesh in 2015 (% of value of import)



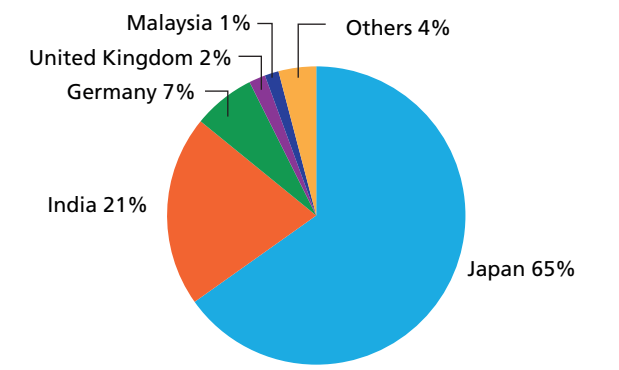
Public-transport-vehicle imports to Bangladesh in 2015 (% of import)



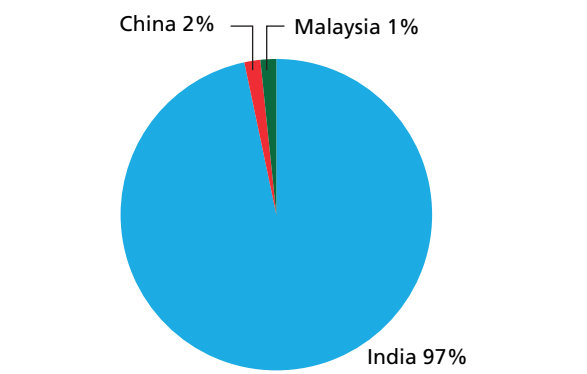
Source: Computed by Centre for Science and Environment from International Trade Centre statistics, 2015.

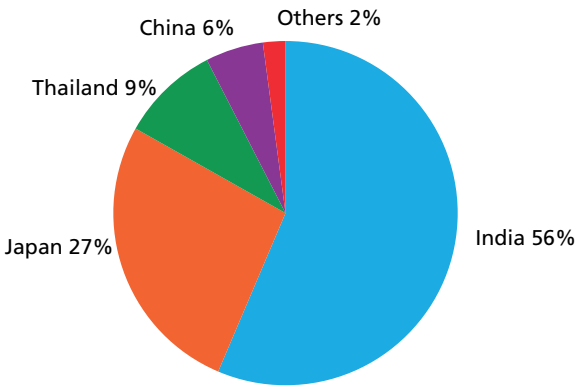
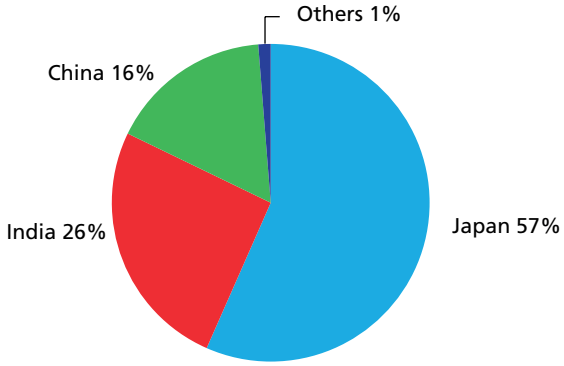
iii. Sri Lanka (2016)

Car imports in Sri Lanka in 2016 (% of value of import)



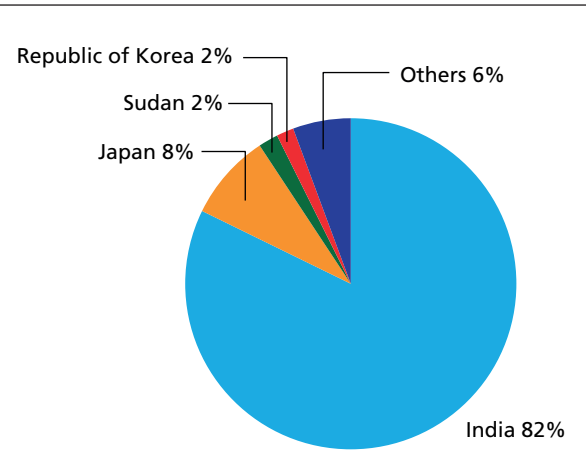
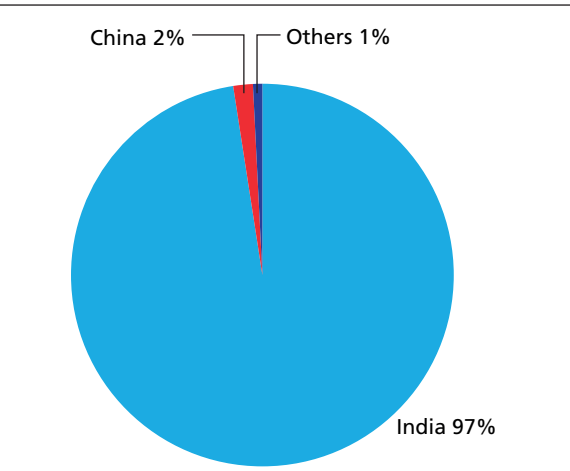
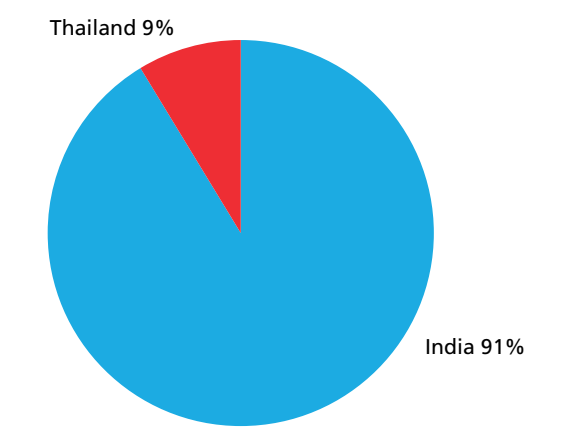
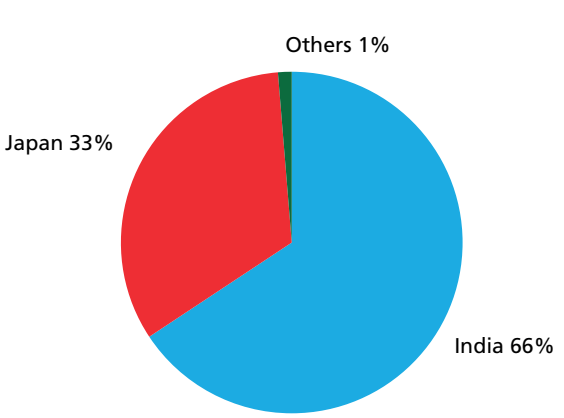
Two-wheeler imports in Sri Lanka in 2016 (% of value of import)



Goods-vehicle imports to Sri Lanka in 2016 (% of value of import)	Public-transport vehicle imports to Sri Lanka in 2016 (% of import)
	

Source: Computed by Centre for Science and Environment from International Trade Centre statistics, 2016.

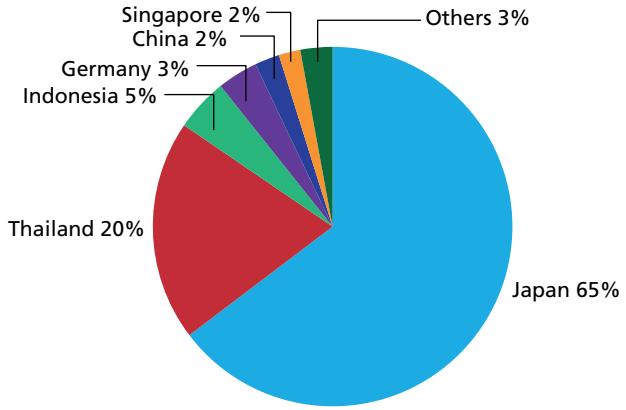
iv. Nepal (2015)

Car imports in Nepal in 2015 (% of value of import)	Two-wheeler imports Nepal in 2015 (% of value of import)
	
Goods-vehicle imports to Nepal in 2015 (% of value of import)	Public-transport-vehicle imports to Nepal in 2015 (% of import)
	

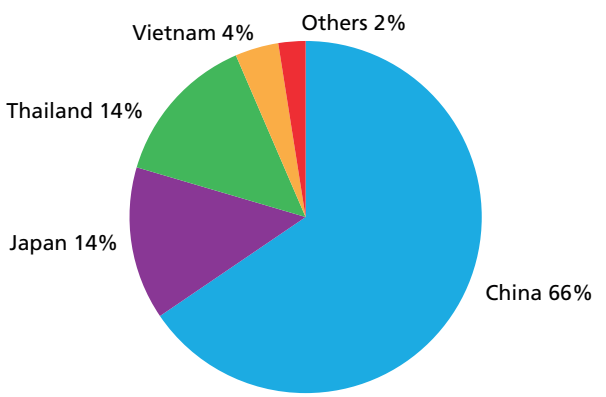
Source: Computed by Centre for Science and Environment from International Trade Centre statistics, 2015.

v. Pakistan (2016)

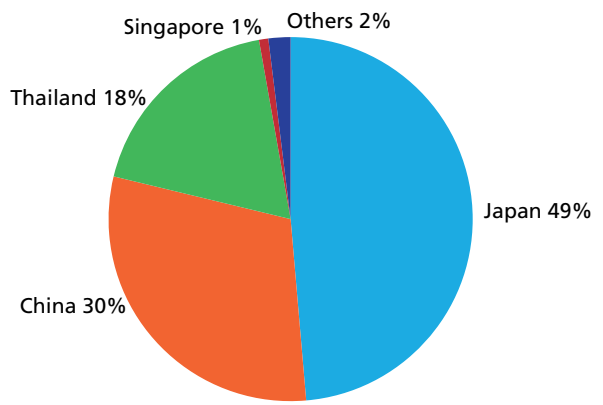
Car imports in Pakistan in 2016 (% of value of import)



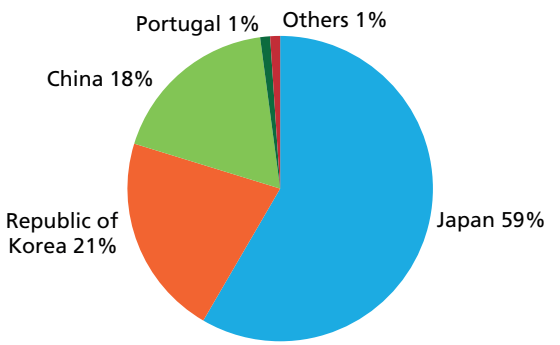
Two-wheeler imports in Pakistan in 2016 (% of value of import)



Goods-vehicle imports to Pakistan in 2016 (% of value of import)



Public-transport-vehicle imports to Pakistan in 2016 (% of import)



Source: Computed by Centre for Science and Environment from International Trade Centre statistics, 2016.

vehicles, and 66 per cent of public-transport vehicles were from India (see *Graph 8 (iv): Nepal (2015) on page 27*).

However, the mix gets more differentiated for cars in other South Asian countries. More cars come from Japan than India. As much as 72 per cent of cars in Bangladesh and 65 per cent cars in Sri Lanka come from Japan, Korea, Singapore and Thailand. The share of Japan increases even in public transport and goods vehicles. But nearly all—97 per cent of two-wheelers—come to Nepal from India.

In Pakistan, nearly all cars come from Japan (65 per cent) and Thailand (20 per cent). Their two-wheeler market is dominated by China (66 per cent), Japan (14 per cent) and Thailand (14 per cent). Japan and China also dominate their goods-vehicle and public- transport markets.

Thus, the share of intercontinental trade is very limited in this region. Only Germany has a small foothold in car market of Bangladesh. This is different from the experience of Africa, which is a nodal point of intercontinental trade.

As the trade is much more contained and originates largely in a small number of countries in Asia, including Japan, India and China, harmonization of emissions and fuel-quality standards across the region can help the entire region to leapfrog quickly. Japan is already the frontrunner. China has graduated to Euro V emissions and is poised to phase in Euro VI soon. India, which has already moved to Euro IV vehicle emissions nation-wide in 2017, is now poised to go directly to Euro VI emission standards in 2020. This means Euro VI-compliant fuel and vehicles will be available more widely in the region. This is an opportunity for vehicle-importing countries to harmonize their standards and imports with the improved standards.

Trade in used vehicles

Current databases on international trade in vehicles do not differentiate between new and used vehicle streams. Estimates of international trade in used-vehicle trade are not easy to come by. Information is fragmented and scattered and discontinuous and is largely available from expert studies, consultant reports and limited official databases. This makes assessment of direction, composition and quantum of trade difficult. Often data from different sources are not comparable. Yet the jigsaw of this data gives fair idea about what is going on.
Broadly, there are several layers in the used-vehicle trade, including:

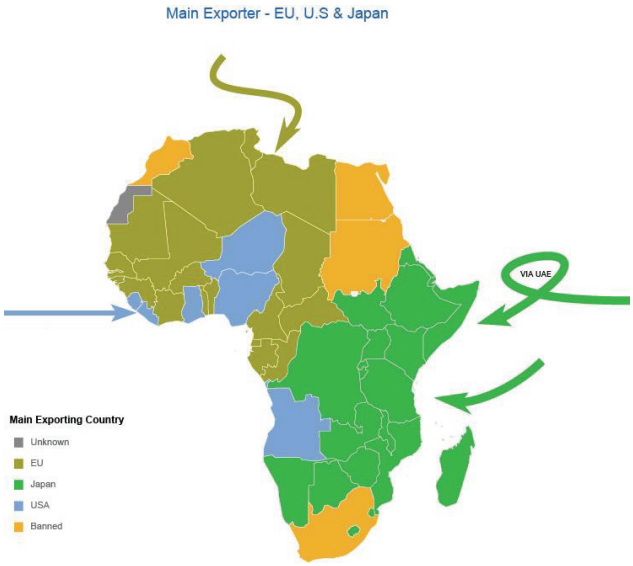
i) Domestic market within a country
ii) Trade within countries of contiguous geographies, and
iii) Intercontinental trade.

The first layer is domestic trade within the national boundary of individual countries. This is common and widespread. Vehicles change several hands in domestic markets. It has been estimated in Ricardo-AEAT, 2015 that in the EU, for instance, as much as 94 per cent of the cars have a second life, 87 per cent have a third life and about 27 per cent have a fourth life. But fourth life is not common because of the higher scrappage rate of older vehicles.[8] Even in high-income countries, income disparity creates demand for used vehicles within the domestic market. However, high-income countries normally have the requisite policies in place to address their emissions, fuel efficiency and safety aspects. However, a number of these older vehicles find their way into the international market.

The second layer is the trade in used vehicles of varying age and vintage within the geographies that are largely contiguous to major vehicle-producing countries. This is, for instance, evident in the EU. The United Nations Environment Programme (UNEP) has reported that about 60 per cent of EU trade in used cars is towards other EU countries. Germany and Spain are significant exporters to Eastern Europe and Caucasus, while also sending out a large fleet to other continents of Central Asia and Africa.[9] A significant number of vehicles from the US flow to its immediate neighbour Mexico. A similar trade pattern is also evident in South Asia.

The third layer is largely intercontinental trade in used vehicles that predictably flows from high-income countries of the US, EU, Japan and South Korea to low-income vehicle-importing countries in Africa, Asia and Latin America. According to the 2016 working paper ID-044 of the Office of Industries of the United States International Trade Commission, the top five passenger-vehicle-

Map 1: Direction of trade from high-income countries to Africa



Source: Ariadne Baskin 2018, Africa Used Vehicle Report*, Paper presented at the Africa Clean Mobility Week, Nairobi, 12–16 March 2018.*

Table 1: Indicators for Ethiopia, Kenya and Nigeria

Indicator (unit)	Ethiopia	Kenya	Nigeria	Year
Fleet size	587,400	1,300,000	3,590,000	2015
Sales of new vehicles (per annum)	18,000	19,523	26,400	2015
Commercial vehicles (% new sales)	16	86	29	2015
Passenger vehicles (% new sales)	84	14	71	2015
New vehicles (% new sales)	15	20	10	2015
Second-hand vehicles (% new sales)	85	80	90	2015
Motorization rate (per 1000 people)	2	28	20	2014

Source: Deloitte Africa Automotive Insights Report, 2016. https://www2.deloitte.com/content/dam/Deloitte/za/Documents/manufacturing/ZA_Deloitte-Africa-automotive-insights-Ethiopia-Kenya-Nigeria-Apr16.pdf

exporting countries are Canada, Japan, Korea, Mexico and the United States. Used vehicles travel widely as is evident from data from the Japan Export Vehicle Inspection Centre that identifies the top ten destinations across Asia, Africa and Latin America, as reported by UNEP.[10]

Not only is trade in used vehicles on the rise—it was valued at over US $17.6 billion in 2014—it is also a substantial part of the export earnings of vehicle-exporting countries. In Japan, used-vehicle export in 2014 was 7 per cent of vehicle exports by value. The quantum of this trade is significant.[11] Used-vehicle exports from North America largely originate from the US and Canada; the US is the largest exporters of used vehicles that accounted for an estimated 14 per cent of total US vehicle exports by value in 2014.[12] The value of used vehicle exports from these two countries is over US $10 billion annually.[13] Exports of used passenger vehicles originating in Japan, Canada, the United States, Korea and Mexico in 2014 was estimated to be 6 per cent of the value of their total passenger vehicle exports that year.[14] Thus, there is considerable economic stake in this trade in vehicle producing countries.

That vehicle import is hugely dominated by used vehicle is evident from data from the *Deloitte Africa Automotive Insights Report, 2016*[15] for the major countries of Ethiopia, Kenya and Nigeria. The share of used vehicles is 80–90 per cent of the total imported fleet. In Kenya, the share of commercial vehicles in new sales is the highest at 86 per cent. But in Ethiopia and Nigeria, the share of passenger vehicles in new sales is as much as 84 per cent and 71 per cent respectively (see *Table 1: Indicators for Ethiopia, Kenya and Nigeria*).

Used vehicles in South Asia

It is more difficult to assess the trade in used vehicles in South Asia. Anecdotal data from local officials and markets show that there is huge influx of used vehicles from Japan, Singapore etc. However, the experience of the two transition economies of China and India is expected to be different. Available information shows that there is no legal export of used vehicles from China.

In India, given the nature of the market with much lower income profile of vehicle users, vehicles are used more intensely and last longer in the used-vehicle market within the country. Some reconditioned and used vehicles may get traded as part of the grey market through its porous borders. But there does not seem to be any large-scale legal overseas trade in used vehicles. India also does not allow import of used vehicles. It has, however, a thriving market in recycled and reusable vehicle components and this trade is directed towards other South Asian countries and even to Africa to cater to the new fleet that has been exported.

Detailed data on the share of used vehicles in vehicle imports in South Asia is not available. As in Africa, used vehicles dominate the car market of South Asia. Japan, Thailand, Singapore, Korea and to some extent Germany dominate this market. Market information and anecdotal data from dealers and others also shows that there is a grey market in used vehicles through the porous borders.

How is used vehicle trade organized?

This part of the supply chain, of international trade in used vehicles, is not well documented. Fragmented information shows that cars are imported through independent dealerships. Or Original Equipment Manufacturers (OEMs) such as Toyota and Hyundai sell their brands through designated dealers. One set of independent dealers brings these cars from OEM dealers in South Africa, Dubai, America etc. There is also a chain of dealers and sub-dealers. Sub-dealers source cars from OEM-appointed dealers but they handle a much smaller market share—about 10 per cent. But dealers also bring cars that are not supported by OEMs and thus create a grey market.

Countries are connected by both the sea route and inland route. For example, in addition to direct shipments to Nigeria, the Port of Cotonou in neighbouring Benin is a key transit point for second-hand vehicles destined for the Nigerian market. It is estimated that 85 per cent of Benin's used-vehicle imports end up in Nigeria. There are anecdotal evidences on stripping yards in Japan and Europe where vehicles are stripped off of the emissions-control systems but it is not clear how are they refurbished for markets with lower environmental safeguards.

The formal trade in new vehicles is governed by the bilateral trade agreement. A review of some agreements between India and countries of Africa show vehicles are listed as a permissible item.

Used-vehicle import in high-income countries

It is erroneous to think that used vehicles are imported only by low- and middle-income countries. In fact, high-income countries without a substantial vehicle-manufacturing industry of their own also import used vehicles. Australia and New Zealand are good example.

Australia had an automobile industry that is now closed. Even though it had the key players, including Ford, Toyota and now General Motors' Holden, its automobile plants have been closing over the last several decades. It is said that the government has not come up with any favourable policy to protect automakers against the high Australian dollar, production costs and a shrinking domestic market. There are some small players, including Kenworth, a subsidiary of Paccar, and Iveco.[16]

As a result, vehicle import has become very important in the country. It has also led to the import of used vehicles. In 2018, the government further reformed the laws on car importation that are likely to have huge impacts. It has been reported that from 2018 onwards, private citizens can import brand-new cars and avoid tariffs on imported used cars and save over local dealers.[17]

This will open up the domestic markets of dozens of countries around the world to private Australian buyers. Private buyers can purchase and import cars from countries with comparable standards to Australia. It is reported that Japan and the UK have been approved.

The import rules say that cars must be no older than 12 months old, and must have no more than 500 km on the odometer. The price difference won't be enough to justify importing cheaper cars, but just below Australia's circa $64,000 Luxury Car Tax threshold (and beyond) there will be some bargains, with countries like the UK and Japan both selling identical cars at a significant discount to Australian dealers. There will be an 'Australia tax' on cars.[18] Used cars will also become far easier to import with the amendment of the Customs Tariff Act 1995 to remove a $12,000 special duty that applies to used imports. That tariff apparently was applied consistently. Cars that are imported will have a specific plate affixed and their details added to a new register as well as the traditional blue-slip inspection and registration process.[19]

Similarly, New Zealand has become a major importer of used vehicles mainly because there is no car-manufacturing industry.[20] It had assembling facilities based on import of completely knocked-down units. The government had also imposed high import duties on import of fully built cars, both new and second hand, to protect domestic assembly. However, New Zealand being a high-income country, its consumer demand was more aspirational and the high import duties led to a huge demand for better imported and branded cars than assembled cars. Imported cars here were more expensive that locally assembled ones.

Even for distributors, importing fully built cars is more convenient than assembling cars. During the 1980s and 1990s the government had relaxed import duties, which led to a massive import of second-hand cars from Japan. New Zealanders reportedly prefer Japanese cars over European models, either for cultural or technical reasons. Based only on import of vehicles New Zealand's per capita ownership is 774 vehicles per 1,000 people, as opposed to 591 in Japan, where most of the cars come from.

However, New Zealand has also faced problems with import of second-hand vehicles as they also end up getting damaged vehicles or vehicles facing recalls in their home country. The New Zealand government has enforced verification, inspection and a system of database management to monitor imports. Also, end-of-life recyclers operate. Import regulations do not stop imports of second-hand vehicles but focus on quality benchmarks.

Important to set terms for this trade

In low- and middle-income vehicle-importing countries of Africa and South Asia, motorization is riding high on used-vehicle imports. Incentives for old and used vehicles are strong for various reasons. Studies have shown that on average a vehicle's price depreciates faster in a high-income country than in a low-income one. Used vehicles from a high-income country can be sold in low-income countries for higher price, indefinitely extending the lifetime of the imported fleet. Also, it is said that repairs in low-income countries tend to be cheaper because of the lower cost of labour there, holding down maintenance costs overall.[21] The low income countries also get a wider choice of brands at cheaper prices.[22] Thus, limited number of brands in domestic markets, price differentials and differing depreciation rates incite demand and trade in used vehicles. They also push up average age of vehicles in importing countries. High-income exporting countries with high motorization rates, vehicle stocks and high rate of vehicle replacement have become consistent and large suppliers of old vehicles.

But this trade needs regulation to ensure that very old, gross polluters and damaged and unsafe vehicles do not penetrate these markets and trade. It is argued that with proper regulation it is possible to source through international trade quality vehicles that are sometime better than what is locally produced. But importing countries are often not in a position to take advantage of advanced vehicles from exporting countries as they do not have requisite fuels.

On the other hand, exporting countries that have stronger regulations for vehicle inspection, extended manufacturer responsibility, scrappage and end-of-life of vehicles are not vigilant and do not have strong enough regulations for filtering export of used vehicles.

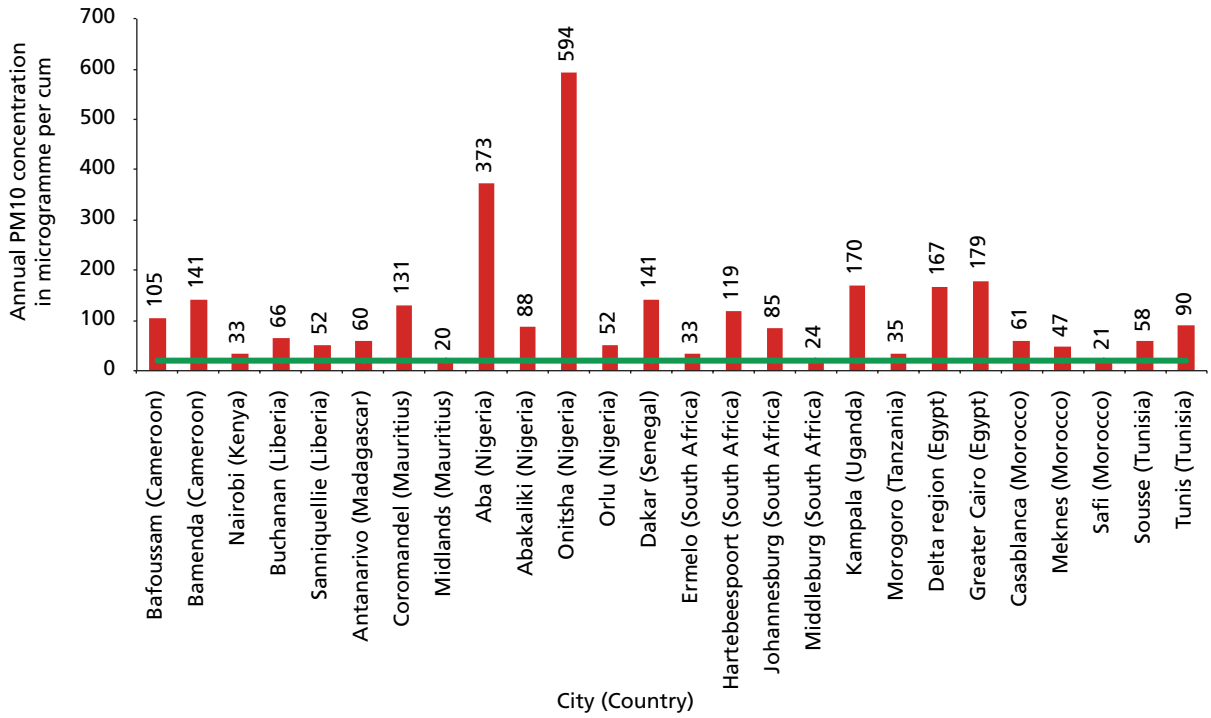
It is important to review the regulatory landscape in both exporting and importing countries as this trade has huge implications for local pollution, health risk and energy security.

SECTION 3: Polluted air and public-health imperatives

A global conversation on import of used vehicles has become so important is because of the rate at which urban air pollution is growing across developing Asia and Africa. A vast majority of cities are caught in a toxic web as their air quality continues to worsen and fails to meet health-based standards. The capacity to monitor and assess the pollution problem remains weak and available data allows only a fragmented picture of the status of air quality in most of the cities. Some of the worst cases of air pollution are found in these cities.

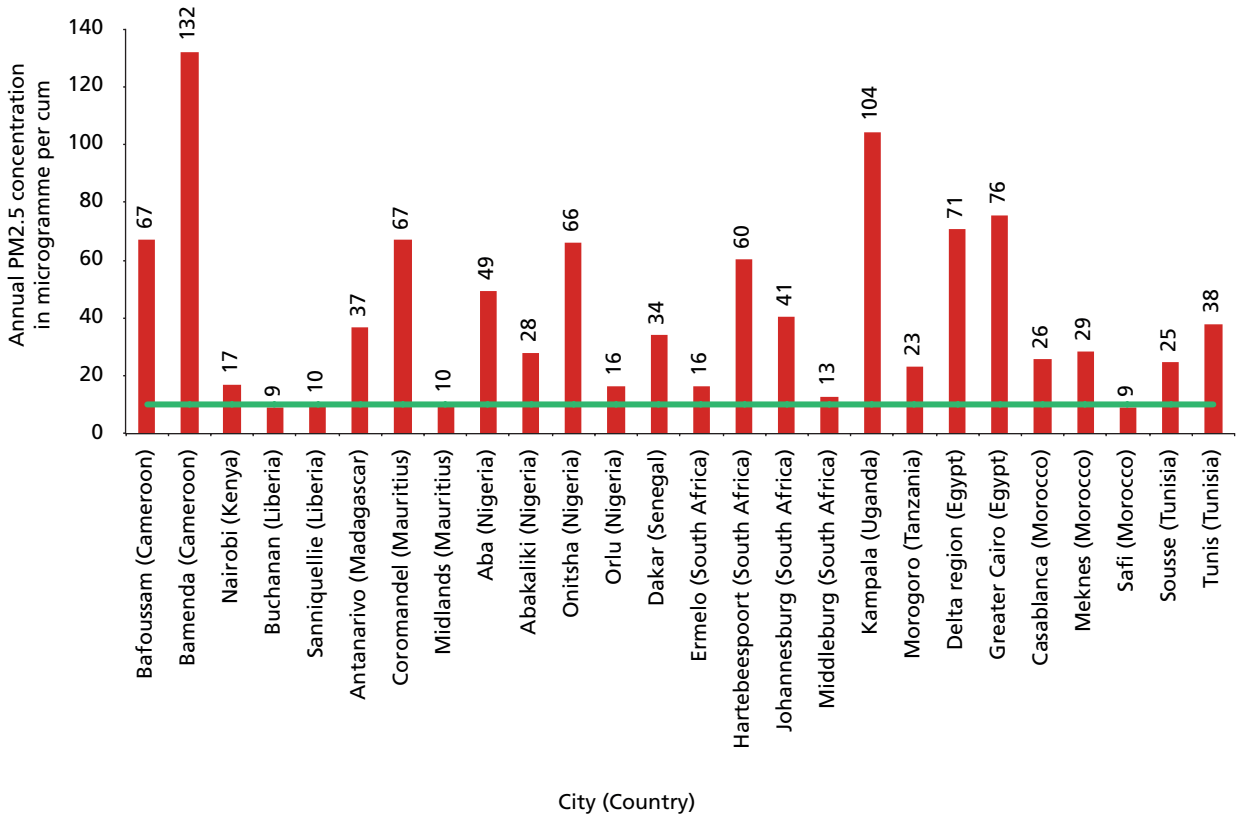
The 2016 WHO database on particulate pollution shows that cities of Africa have already begun to breach the WHO guidelines and in many cases by several times. Cameroon, Nigeria, Uganda, Senegal, Egypt and Mauritius are among the worst affected by particulate matter less than 10 micron size (PM10) and particulate matter less than 2.5 micron size (PM2.5). Not a single city in the African continent has PM10 levels that have not breached the WHO annual guideline for PM10. In fact, PM10 levels have gone up to 30 times higher than the WHO annual PM10 guideline of 20 microgramme per cum (µg/m^3) in Onitsha in Nigeria, 8.5 times the annual guideline in Uganda, and almost nine times the guideline in Egypt (see *Graph 9: PM10 levels in cities of Africa*).

Graph 9: PM10 levels in cities of Africa



Source: WHO air quality database, 2016

Graph 10: PM2.5 levels in cities of Africa



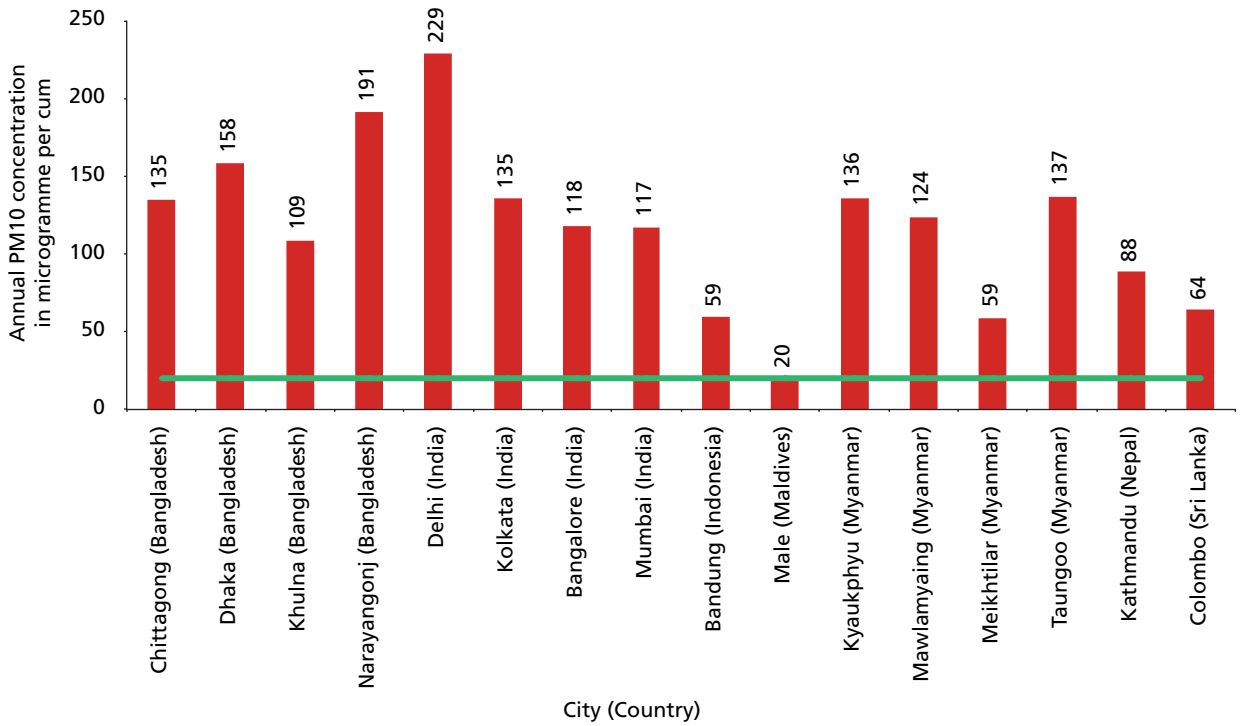
Source: WHO Air quality database, 2016

Only two or three cities comply with the WHO annual PM2.5 guideline. The highest levels of PM2.5 are in cities in Cameroon (13.2 times the guideline), Uganda (10.4 times the guideline) and Egypt (7.6 times the guideline) (see *Graph 10: PM2.5 levels in cities of Africa*). It may however be noted that WHO's new air-quality database released in May 2018 also mentions that air quality data in the Africa region is very weak and could be obtained only for eight out of 47 countries.[1]

Another area of concern is South Asia, among the most polluted in the world. Other than the Maldives, all the cities in this region, spread across different countries, have PM10 levels significantly higher than the annual WHO PM10 guideline. The highest levels are in the Indian capital Delhi, where levels are up to 11.5 times the annual WHO guideline, followed by Narayanganj in Bangladesh, where the levels are 9.6 times the guideline. Dhaka, Chittagong and Khulna in Bangladesh and Kathmandu in Nepal are also among the most polluted in the region (see *Graph 11: PM10 levels in South Asia*).

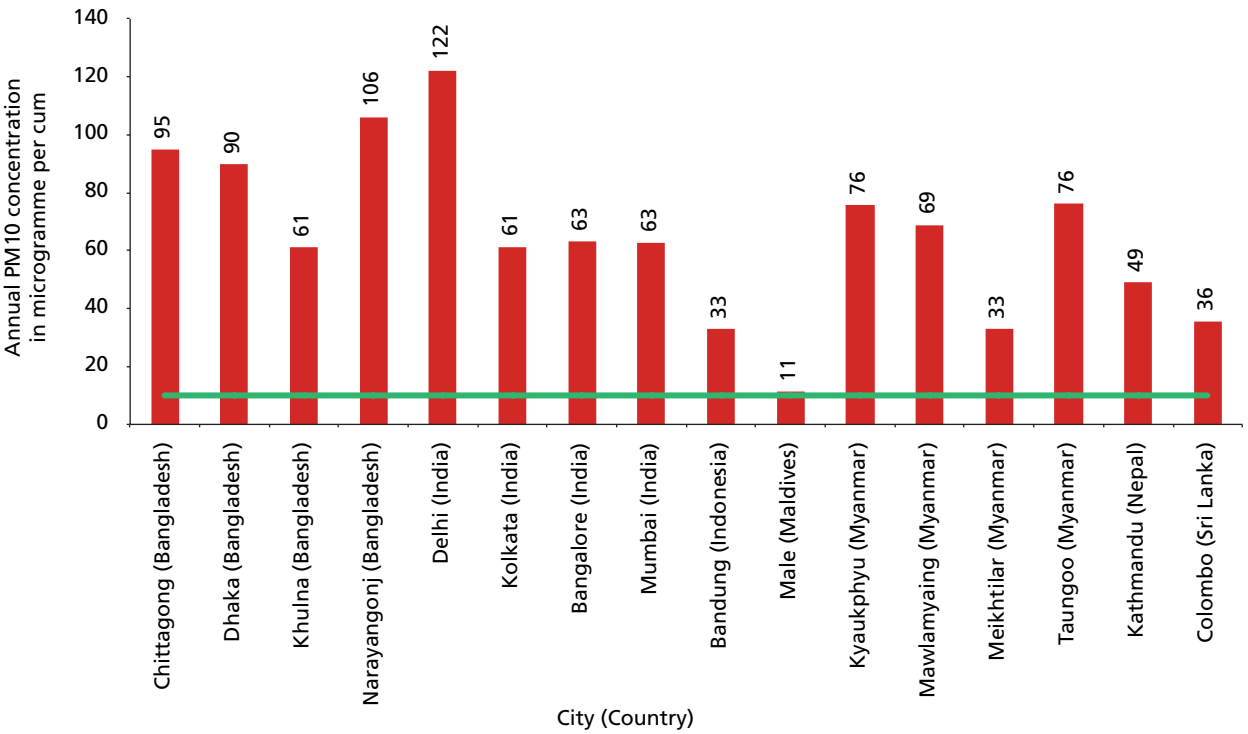
Similarly, none of the cities in the subcontinent that are tracked by the WHO meets the WHO annual guideline of PM2.5 concentration. Delhi has the highest levels of PM2.5 concentration, 12.2 times the WHO guideline, followed by Narayanganj in Bangladesh with levels 10.6 times the guideline (see *Graph 12: PM2.5 levels in South Asia*). In the database released by the WHO in 2018,

Graph 11: PM10 levels in South Asia



Source: WHO Air quality database, 2016

Graph 12: PM2.5 levels in South Asia



Source: WHO Air quality database, 2016

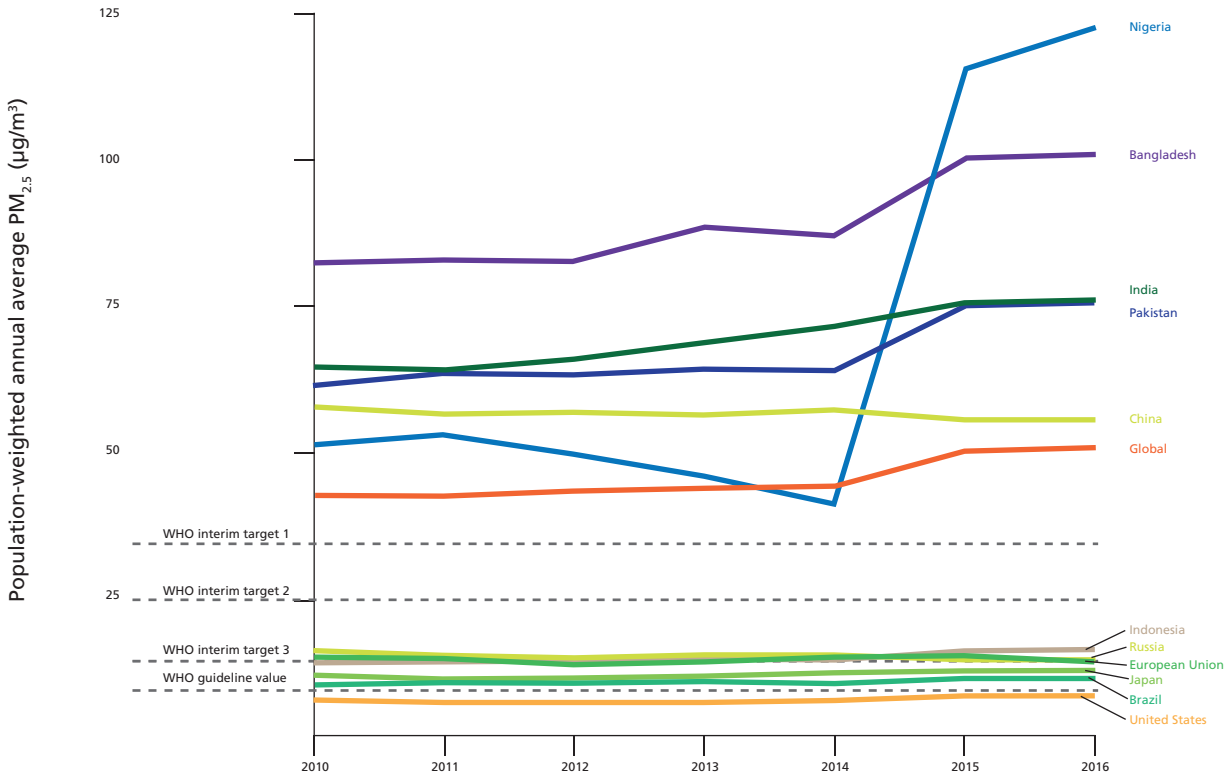
expansion of air-quality monitoring in South Africa has brought several more South African cities to the forefront.

Public health challenge

According to the newly released The State of Global Air 2018 by the Boston-based Health Effects Institute, the highest concentrations of population-weighted annual average particulate matter in 2016 were in countries of North Africa (e.g. Niger at 204 µg/m^3 and Egypt at 126 µg/m^3), West Africa (e.g. Cameroon at 140 µg/m^3 and Nigeria at 122 µg/m^3). However, longer-term trends suggest a decline in PM2.5 exposures in Nigeria over the last 26 years, with limited evidence pointing to general decline in mineral dust emissions and open burning. But Nigeria is still at the top of the chart in terms of population-weighted annual average PM2.5 (see *Graph 13: Population-weighted annual average PM2.5—Global scenario*).

The State of Global Air 2018 also found that long-term exposure to outdoor and indoor air pollution contributed to 6.1 million premature deaths from stroke, heart attack, lung cancer, and chronic lung disease and to a loss of 106 million life years worldwide in 2016. That makes air pollution the fourth highest cause of death among all health risks, after high blood pressure, diet and smoking. India and China together have the highest numbers of deaths due to particulate matter. These critical numbers of Global Burden of Disease (GBD analysis also

Graph 13: Population-weighted annual average PM2.5—Global scenario



Source: The State of Global Air, 2018, Health Effects Institute, US.

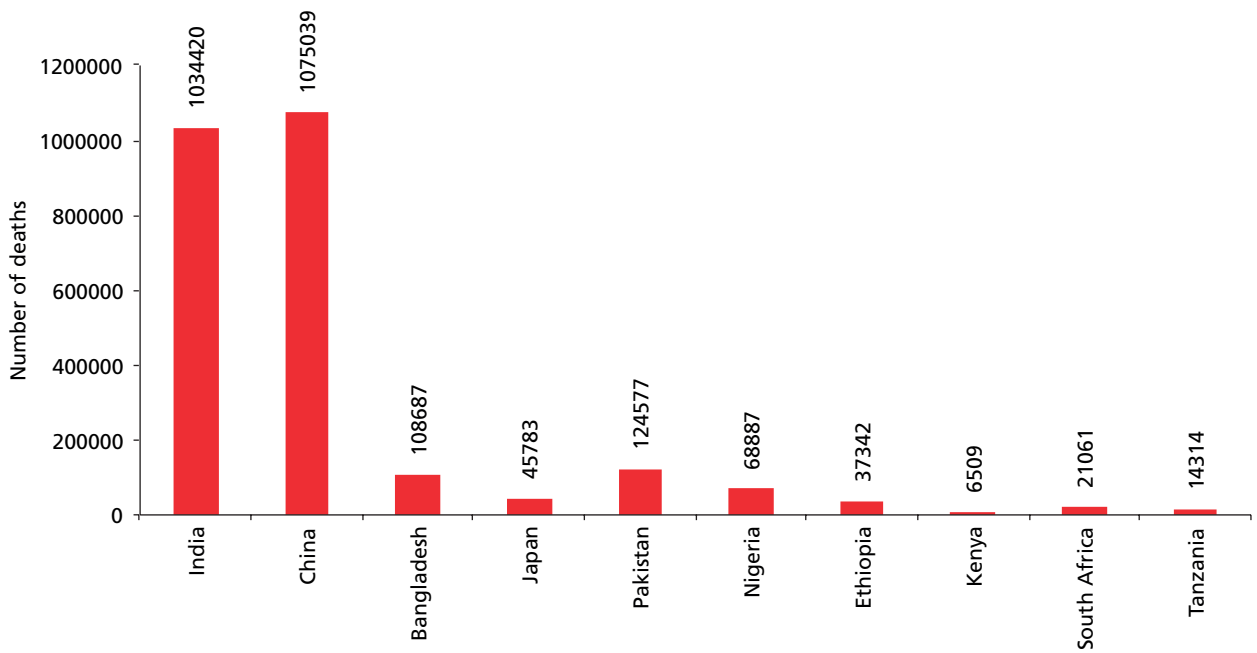
highlight the critical interplay between the trends in population structure, especially ageing of population, underlying disease, and economic factors, and air pollution levels in developing countries. Large-scale urban poverty further intensifies the effects.

The developing world of Africa and South Asia are in the grip of a double burden of disease. While the impact of communicable disease is still large, the burden of non-communicable diseases (NCDs) that are also largely affected by air pollution, are rising steadily. The African region reports one of the highest death rates from NCDs. Air pollution can exacerbate this. In Sub-Saharan Africa (SSA), NCDs are expected to surpass infectious diseases by 2030. NCDs are estimated to account for 24 per cent of all deaths in Nigeria.[2] The incidence of cancer is increasing in all regions.

Adverse impacts of air pollution will be enhanced by the ageing of population. The elderly experience the greatest loss of healthy life-years due to NCDs that are affected by particulate matter. Among those 70 years or older, for example, PM2.5-attributable ischaemic heart disease alone accounted for 16.2 per cent of life-years lost in China, 17.8 per cent in India, and over 20 per cent in parts of SSA and North Africa and the Middle East in 2016. Over the past 25 years, this burden in low- and middle-income countries has increased for those aged 50–69 years. In India, for example, it has increased by 24 per cent, from 9.1 million to 11.3 million life-years lost. In the Indian subcontinent, in addition to India, Bangladesh and Pakistan are most vulnerable (see *Graph 14: Number of deaths attributable to PM2.5 in 2016 in Africa and Asia*).

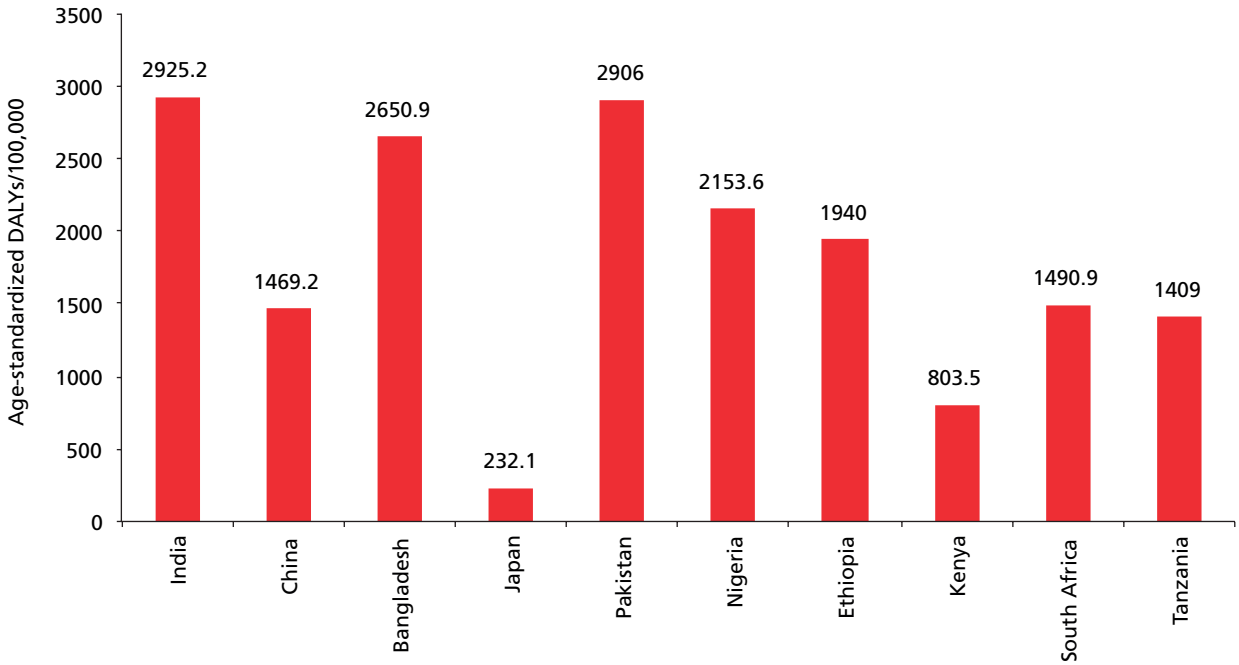
New data from WHO, released in May 2018, shows that age standardized deaths

Graph 14: Number of deaths attributable to PM2.5 in 2016 in Africa and Asia



SOURCE: The State of Global Air, 2018, Health Effects Institute, US

Graph 15: Healthy Life Years lost due to air pollution in Africa and Asia



SOURCE: The State of Global Air, 2018, Health Effects Institute, US

per 100,000 people due to ambient air pollution is 78 in low- and middle-income countries of Africa—this is third globally, after the Southeast Asia region, which includes South Asia (90) and East Mediterranean at 85.

The UN Economic Commission of Africa has estimated that the cost of air pollution in a number of African cities can be as high as 2.7 per cent of GDP[3] (see *Graph 15: Healthy Life Years lost due to air pollution in Africa and Asia*). In 2012 WHO estimated that there were 176,000 deaths per year in Africa due to outdoor air pollution and an estimated 600,000 deaths per year from indoor air pollution.[4] Premature deaths in Africa are lower than the world average. But data is also a barrier. The University of Nairobi has estimated that the economic loss per year in Kenya of vehicle emissions is 115 billion KSh from illnesses and deaths.[5] The World Bank's *The Little Green Data Book 2015* states that 94 per cent of population is exposed to PM2.5 exceeding WHO guidelines. The *2016* edition of the book T*he Little Green Data Book 2016* states that 100 per cent of the Nigerian population is exposed to PM2.5 levels exceeding WHO guidelines. Air pollution damage costs about 1.2 per cent of their Gross National Income.[6]

Vehicles pose a special challenge

While the cities of Asia and Africa are extremely vulnerable to air pollution, especially to emissions from ageing and outdated vehicle technologies, the spotlight on health impact of vehicular pollution in Africa and South Asia is particularly important as this region is most vulnerable to import of old and used vehicles of the world.

Vehicles are among the most rapidly growing source of pollution across Asia and Africa and pose a very complex challenge. These are responsible for very

high exposure as vehicular emissions take place in the breathing zone of people. People living or working in close proximity to heavily polluted roadway have very high level of exposure. Vehicles emit tiny and toxic particles and deadliest carcinogens. Studies show how traffic related air pollution is associated with increased risk of pre-term births,[7] smaller brain size, low-birth weights[8] among infants and increased risk of heart disease. In fact, a 2017 UNICEF report mentions that air pollutants inhaled during pregnancy can cross the placenta and affect the developing brain of a foetus, with potentially lifelong effects.[9]

Studies by the US-based non-profit Health Effects Institute show that in densely populated developing Asian cities, as much as 50 per cent of population lives or works near roadsides. The maximum effect of vehicular pollution is up to 500 metres from a roadside. There can therefore be tangible health benefits from reduction in vehicular emissions.

There is very little assessment of the health impact of vehicular pollution in cities of Africa and South Asia.

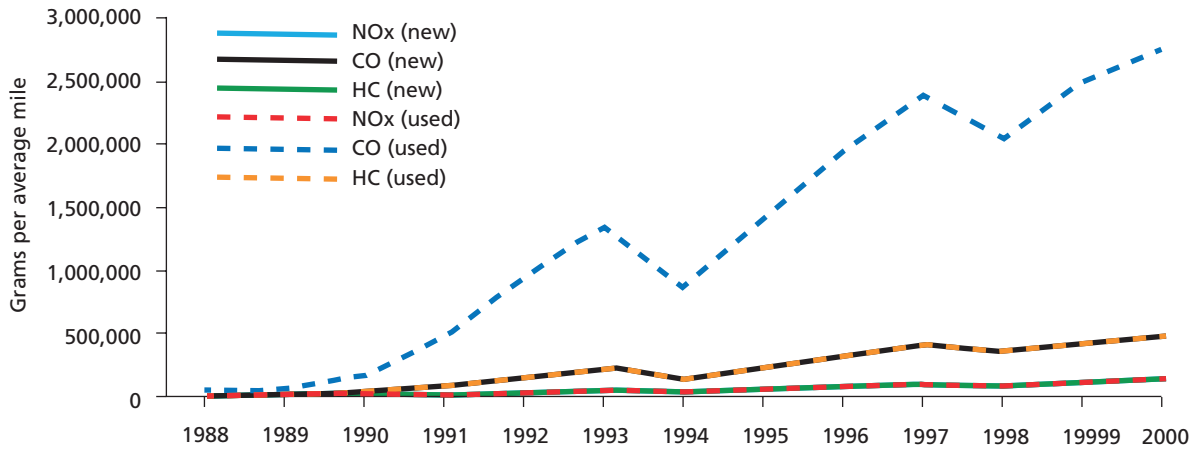
A limited study in 2005 by the Lagos Metropolitan Area Transport Authority confirmed that transport is the major cause of air pollution in the city. Another EIA study carried out by Mechelec Construction (Nigeria) in 1996 on behalf of the Lagos Urban Transport Project (LUTP) revealed that the road traffic is the major source of air pollution in the city.

An older study of the University of Lagos[10] in 2002 examined the environmental implication of imported used vehicles. They analysed the data of 12 years (1988–2000) and found that the increasing number of used cars and their incomplete combustion are responsible for high level of carbon monoxide, nitrogen oxides, sulphur dioxide, benzpyrene, aldehydes, ketones, chlorinated organic compounds, ozonides and peroxides, and carbon compounds containing nitrogen such as peracetyl nitrides.

The carbon monoxide emission of used vehicles was much higher than that in new ones. The trend estimated showed the difference in different pollutants between used and new vehicles in Nigeria (see *Graph 16: Estimated emissions from old and new vehicles in Nigeria in 1988–2000*).

The Centre for Science and Environment estimated, on the basis of data provided

Graph 16: Estimated emissions from old and new vehicles in Nigeria in1988–2000

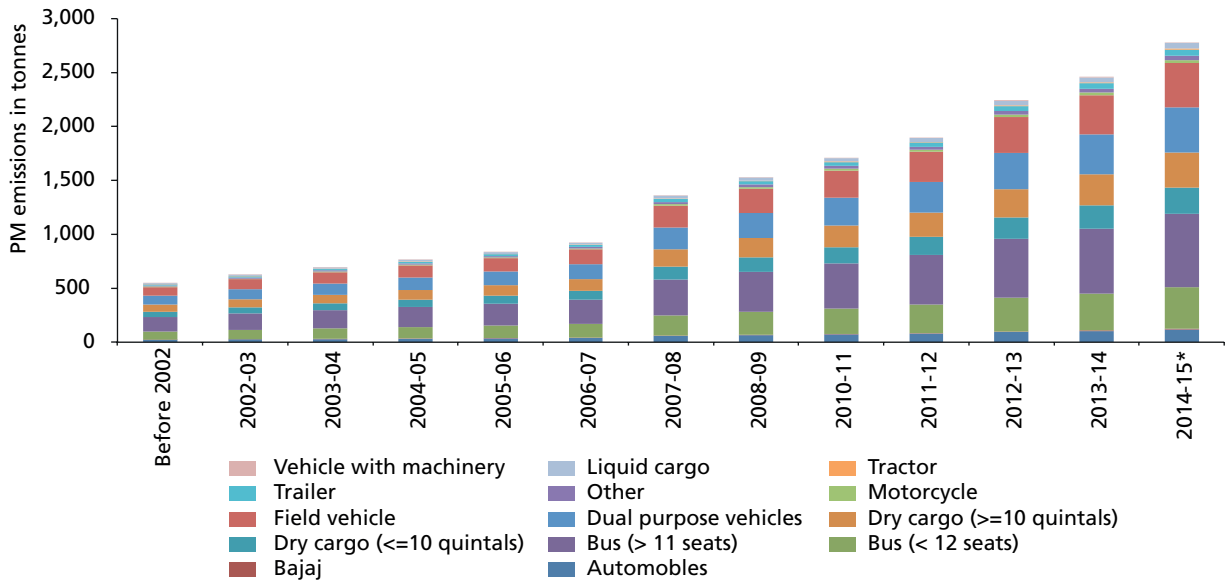


Source: University of Lagos, Nigeria, 2002

by Addis Ababa Transport Authority, the trend in pollution load from Nthe increasing vehicle numbers in Ethiopia. Currently, the share of personal vehicles is comparatively lower. Heavy-duty vehicles dominate—they account for over half—both particulate and nitrogen oxide load from vehicles (freight and buses) that run on diesel. The share of personal vehicles though comparatively small is growing (see *Graph 17: Trend in Particulate matter emission load from vehicles in Ethiopia* and *Graph 18: Nitrogen oxide load from vehicles in Ethiopia*). The total pollution load from all vehicles has increased by 5.4 times in 2002–15.

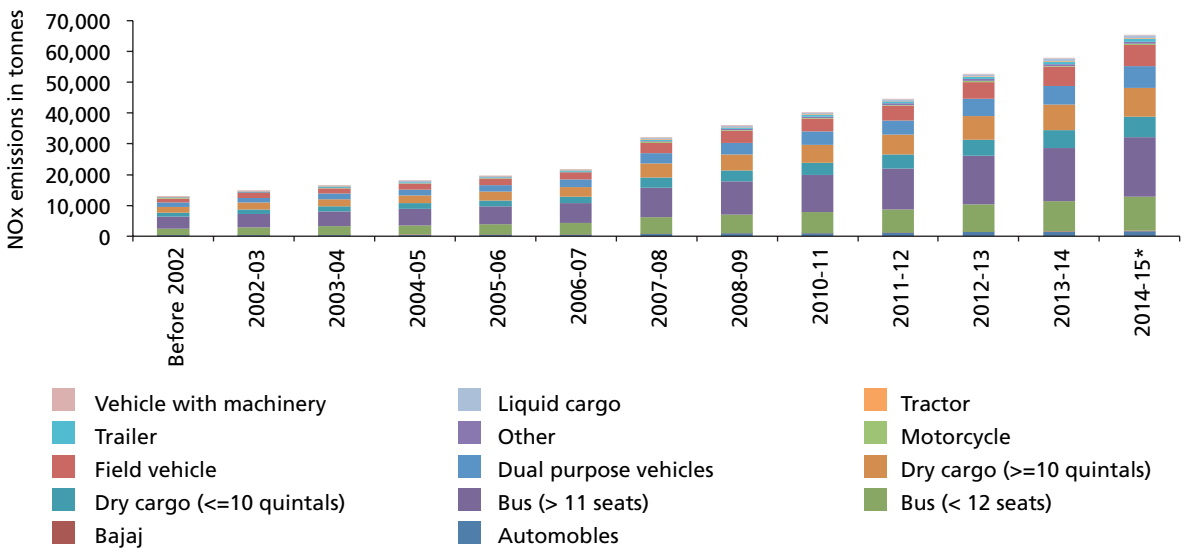
Several cities in India have carried out studies on the impact of vehicular pollution, especially on the vulnerable groups like traffic policemen. In

Graph 17: Trend in particulate emission load from vehicles in Ethiopia (2002–15)



Source: CSE estimation based on data provided by Addis Ababa Transport Authority

Graph 18: Trend in nitrogen oxide emission load from vehicles in Ethiopia (2002–15)



Source: CSE estimation based on data provided by Addis Ababa Transport Authority

Sprinkling of local health studies in vehicle-importing countries

Very few local studies have been carried out on the health impact of air pollution in vehicle-importing countries of Africa and South Asia. But a sprinkling of studies, which are fairly old, provide some evidence at the early stages of growth. This is only expected to get worse with time and rising pollution.

Addis Ababa: Older studies in Addis Ababa show that of the top 20 leading causes of outpatient visit by region in all health centres and hospitals of Addis Ababa, acute respiratory infections is of prime concern. Cases of acute respiratory infection increased from 1,48,000 in 2006–07 to 2,07,000 in 2007–08. The primary cause is attributed to emissions from vehicles.[1] Another study has identified more than 18 air pollutant elements in highly polluted area affected by traffic air pollution.[2]

Ghana: In Ghana, acute respiratory illness is among the top 10 causes of out-patient hospital visit.[3]

Nigeria: A Nigerian study by Delta State University on ambient particulate pollution and health impact in Nigerian cities (2001–06) has found significant prevalence of cough, catarrh, eye infection, asthma, chronic bronchitis etc. linked to traffic pollution.[4]

Colombo: Colombo, a coastal city with lot less pollution than most of Asia and Africa, has also reported health impacts. A 1999 study by the Faculty of Medicine, University of Colombo, found a significant association between ambient air pollution (SO_2 and NOx) and acute childhood wheezing episodes in Colombo. Children experiencing wheezing (and requiring nebulization) were observed and found to be statistically significant.[5] Children required more frequent medical visits and school absenteeism had become common. Senior citizens often experience difficulties in breathing, coughing and chest tightness. Another 2005 study found nearly 20 per cent of asthma cases that could be attributed to PM10. Studies attribute Rs 22–17 billion to health damage cost owing auto diesel emissions in Colombo. Diesel vehicles were responsible for 96 per cent of SO_2 and 89 per cent of PM10 from the transportation sector.[6]

Kathmandu: A survey by Clean Energy Nepal and Environment and Public Health Organization in 2003 found patients with respiratory illnesses in emergency departments of major hospitals in Kathmandu increasing. Most patients are in the 51–75 age group. The Ministry of Environment, Science and Technology (MoEST) estimated in 2005 that the valley's air pollution resulted in approximately 1,600 premature deaths per year. The Clean Energy Nepal further estimated that the total benefit of reducing valley's PM10 levels to 50 µg/m^3 would amount to US$1.86 billion per year.[7] A study published in Atmospheric Pollution Research in 2009 found high density traffic areas and road intersections of the valley severely polluted by PM10 that can be considered as 'hazardous' in comparison with the MoPE's benchmark of 425 µg/m^3.[8]

A 2009 study by Stockholm Environment Institute found that the number of in-patients in three major hospitals in Kathmandu

Mumbai, on two high-density traffic areas, the incidence of cough, bronchitis and cardio-respiratory disorders were higher, cardiac toll had increased and cancer deaths had remained the same. Automobile exhaust added significantly to mortality and morbidity.[11] In Kolkata, lung volumes and flow rates were significantly more affected among students in schools along roads than rural controlled group.[12] Commuter exposure to VOCs especially BTX travelling in passenger cars (with and without catalytic converters) along two congested urban routes found that the mean in-vehicle benzene concentration was reduced to from 712 µg/m^3 to 112.4 µg/m^3 after the introduction of catalytic converters. The in-vehicle concentration varied with engine type and age of the vehicle.[13] In Chennai, traffic police, bus drivers, and auto-shop workers were, significantly, associated with lower haemoglobin levels.[14] In Hyderabad, traffic police was found to have increased oxidative stress, lung damage and respiratory problems.[15] Studies also show significant increase in chromosomal aberrations among traffic police.[16] In Amritsar, a study found increased chromosomal aberrations due to occupational exposure to polluted air and automobile exhausts.[17] In Jaipur, a study on traffic policemen found reduced lung function due to traffic pollution.[18]

valley suffering from COPD had significantly increased between 1992 and 2003. Increase is highest during winter.[9]

Dhaka: According to a World Bank study, air pollution kills 15,000 Bangladeshis each year. Bangladesh could save $200 million–800 million per year, about 0.7–3 per cent of its gross national product, if air pollution in the country's four major cities was reduced. Around 6.5 million people in those cities suffer each year. Vehicular air pollution is a major cause of respiratory distress in urban Bangladesh. According to the National Institute of Diseases of Chest and Hospital (NIDCH), nearly seven million people in Bangladesh suffer from asthma; more than half of them are children.[10]

A study by researchers from BUET (2010) assessed how the exposure in Dhaka's air affects the pulmonary system of traffic police. Around two-thirds of the traffic police working for more than 10 years were found to be in a potentially alarming state and needed immediate treatment.[11]

Sources:

1. *Alok Tiwari 2011, 'Urban Air Pollution Caused by Automobiles in Addis Ababa, Ethiopia and its Health Consequences', The IUP Journal of Environmental Sciences, vol. V, no. 3, August.*
2. *Awoke Taddesse Hailu et al. 2013, 'Investigation of Traffic air Pollution in Addis Ababa City around Selected Bus Stations using Instrumental Neutron Activation Technique', International Journal of Basic and Applied Science, Vol. 1, No. 3, January.*
3. *Isaac Adams et al. 2004, The Burden of Diseases, Bulletin of Health Information, Vol. 1, No. 1, October, p. 7.*
4. *S. Efe 2008, 'Spatial distribution of particulate air pollution in Nigerian cities: Implications for human health', Journal of Environmental Health Research, vol. 7, no. 2.*
5. *Senanayake et al. 1999.*
6. *Sunil Chandrasiri 2006.*
7. *Dieter Schwela 2009, 'A Strategic Approach for Air Pollution Reduction in Kathmandu Valley', Stockholm Environment Institute, York.*
8. *Ahmad Kamruzzaman Majumder et al. 2012, 'Assessment of occupational and ambient air quality of traffic police personnel of the Kathmandu valley, Nepal; in view of atmospheric particulate matter concentrations (PM10), Atmospheric Pollution Research, Vol. 3. No. 1.*
9. *Dieter Schwela 2009, 'A Strategic Approach for Air Pollution Reduction in Kathmandu Valley', Stockholm Environment Institute, York.*
10. *Shakeel Ahmed Ibne Mahmood, 2011, Air pollution kills 15,000 Bangladeshis each year: The role of public administration and governments integrity, Journal of Public Administration and Policy Research Vol. 3(4), pp. 129-140, May 2011, http://www.academicjournals.org/article/article1380025870_Mahmood.pdf*
11. *Rahman Muhammad Ashiqur et al, 2010, Assessing the Impact of Exposure to Polluted Air on the Pulmonary Systems of Service Personnel Using a Peak Flow Meter, Dhaka, Australian Journal of Basic and Applied Sciences, 4(11): 5533-5549, http://www.ajbasweb.com/old/ajbas/2010/5533-5549.pdf*

Special health concerns around emissions from older vehicles

The import of cheaper used vehicles has implications for higher emissions and fuel consumption. Used-vehicle import also brings vehicles with compromised safety and emission features. Such granular studies are not available for African countries. But evaluation of the vehicle import trend and policy in Mexico city has thrown up insightful data (see *Box: Evidence of high emissions from used-vehicle import in Mexico*). This shows how older fleet increases the overall emissions.

The levels of pollution from older vehicles, especially those without or with damaged emission-control systems, are significantly higher than new vehicles meeting improved emission standards. Emission profiling of older used vehicles have not been carried out in any African country. To understand the difference, it is possible to compare the data set on emission factors. On-road vehicles meeting different emission norms are tested in labs to arrive at actual emission levels called emission factors that reflect the pollution level caused by the vehicle during on-road operation. Country-specific emission factors are generated from time to time. But these are few and far between in the developing world as such studies are resource intensive.

Evidence of high emissions from used-vehicle import in Mexico

Studies carried out UC Berkeley and UCLA researchers[1] have shown that after Mexico allowed import of ten–fifteen-year-old vehicles from the US and Canada under the free trade agreement in 2005–08, the average age of vehicles in the US was 8.8 years. But during the same period the average age of vehicles in Mexico was 11.4 years.

The traded vehicles emitted higher level of local pollutants than the vehicle stock in the US – the difference ranging from 4 per cent for carbon monoxide to 22 per cent for nitrogen oxide. The traded vehicles emitted more than the vehicle stock in the US but also less than the average Mexican vehicles. On an average, weight of traded vehicles has been found to be heavier. Average weight of vehicles that entered Mexico was 3708 pounds in contrast to average weight of 3516 pounds for the US vehicles. Emissions vary across columns by 20 to 30 per cent.[2]

Sources:

1. *Lucas W. Davis and Mathew E. Kahn, 2011,' Cash for Clunkers? The Environmental Impact of Mexico's Demand for Used Vehicles',* ACCESS.
2. *Ibid.*

A cursory compilation and review of emission factors from international literature as well as expert bodies like the International Council on Clean Transportation (ICCT) however can indicate the emission benefit from replacing an older vehicle with a new vehicle meeting the Euro IV emission norm. Euro IV is a 13-year-old norm in Europe. Currently India and other developing countries are following this norm. Since in Africa the Euro IV norm is being proposed as a minimum harmonized requirement for both local production as well as vehicle import, it is possible to compare emissions factors of pre-Euro norm levels as well as other stages of Euro norms to indicate replacement benefits.

Many vehicles that are 25 years or more of age and were produced before emission norms were made mandatory (i.e. vehicles produced pre-Euro norms or before 1992) may still be in operation and are termed uncontrolled-emission vehicles. An uncontrolled-emission diesel light-duty vehicle replaced with a Euro IV (2005) car emits eight times less PM. Similarly, compared to a Euro I (introduced in 1993 in Europe) vehicle a Euro IV (2005) vehicle emits three times less and a Euro II (1996) vehicle emits two times less.

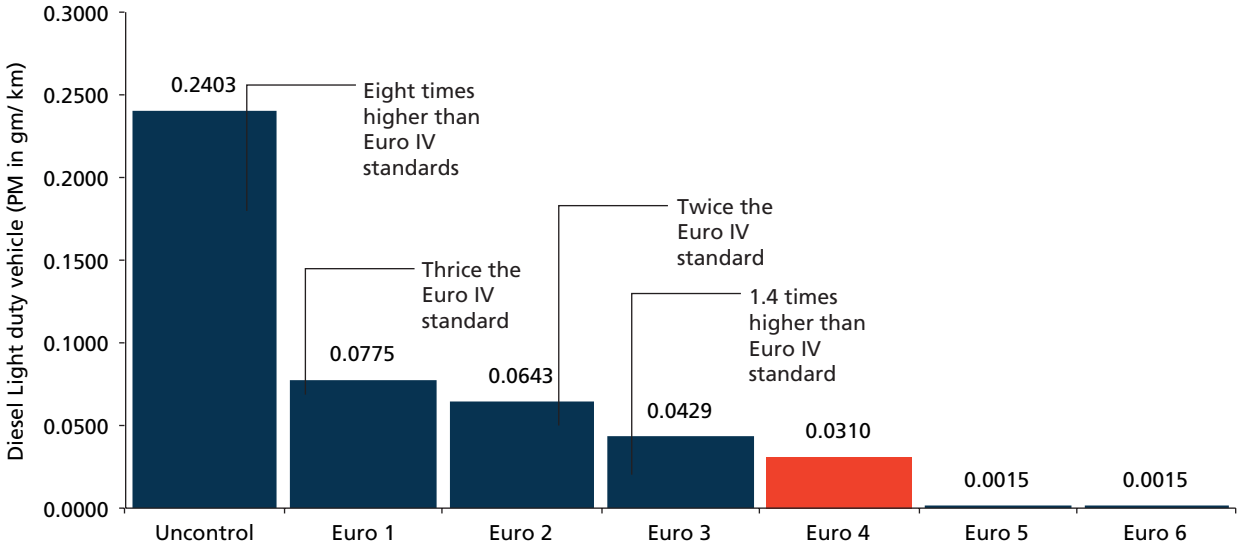
Currently, Euro VI norms are applicable in Europe. If a Euro I (1993) vehicle is replaced with a Euro VI vehicle, PM emissions reduce by 50 times; similarly a Euro II (1996) vehicle replaced with a Euro VI vehicle achieves a PM reduction of 42 times. This builds the case for an emission norm-linked vehicle-replacement policy and emphasizes the need to set an emission-norm roadmap in vehicle-importing countries.

The following information shows how replacing older vehicles with a new ones has the potential to clean up the fleet (see *Graph 19: Comparison of particulate emission factors of Euro IV diesel light-duty vehicles with uncontrolled and lower level of standards* and *Graph 20: Comparison of particulate emission factors of Euro IV diesel heavy-duty vehicles with uncontrolled and lower level of standards*).

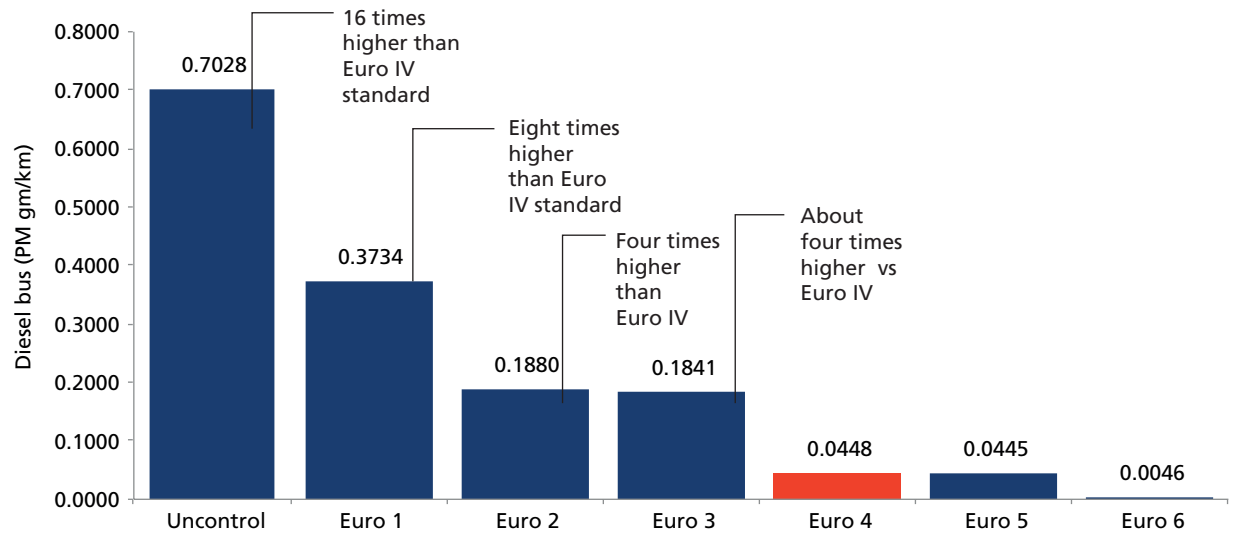
Dieselization in Africa: An emerging threat

Within the context of used-vehicle import, it is important to understand the state of dieselization in Africa. There are special concerns around the toxicity

Graph 19: Comparison of particulate emission factors of Euro IV diesel light-duty vehicles with uncontrolled and lower level of standards



Graph 20: Comparison of particulate emission factors of Euro IV diesel heavy-duty vehicles with uncontrolled and lower level of standards



Source: Based on ICCT data

of diesel emissions. The International Agency for Research on Cancer (IARC) of the WHO has reclassified diesel exhaust as a Group 1 carcinogen. Diesel exhaust is now in the same class as deadly carcinogens such as asbestos, arsenic and tobacco for their strong link with lung cancer. Diesel vehicles also emit several times higher particulate matter and nitrogen oxides than petrol vehicles. Moreover, the new science has now implicated black carbon, the dark fraction of particulate matter, for enhancing climate impacts as well. Most of the diesel particulate core is the dark matter that absorbs light and heat and warms up the climate and fouls up our lungs.

High black-carbon emissions from the explosive increase in diesel vehicle

numbers, use of high- sulphur diesel, outdated vehicle technology and expansion in road-based freight traffic have added to the local health as well as global climate risks. Black carbon is also co-emitted with a range of other toxic and warming gases. This link between local and global impact of diesel particulate now changes the geo-politics around the diesel emissions mitigation as the policies and action on diesel transport varies widely across vehicle-producing and vehicle-importing nations in developed and developing countries.

As high-income counties are now more focused on phasing out diesel cars from city centres and are even planning a complete ban on diesel cars in future, there are additional concerns that a huge fleet of discarded diesel cars and SUVs from these countries will get dumped in Africa, adding hugely to their toxic risk.

Diesel consumption in the region is largely driven by the high share of commercial, freight and public transport that predominantly uses diesel and is not easily substitutable. The share of cars is still comparatively lower but due to price difference in favour of diesel the share of diesel cars is increasing in the region. The comparative share of diesel is very high in countries with a huge difference in prices. In several countries, including Angola, Madagascar and others, the share of diesel in total fuel consumption varies by 70–80 per cent. But countries with similar prices for diesel and petrol have lower consumption of diesel. For instance, in Botswana, Namibia, Lesotho etc., where the prices for petrol and diesel are the same or have very little difference, the share of diesel consumption is around 50–55 per cent. In fact, Nigeria is the best-practice country in terms of fuel pricing; the price of petrol is kept effectively cheaper than that of diesel. In 2016, while diesel prices were 61 US cents per litre, petrol prices were 43 cents per litre. This helped eliminate dieselization of cars and kept the share of diesel consumption substantially lower. The share of diesel consumption in total fuel consumption is only 16 per cent.[19]

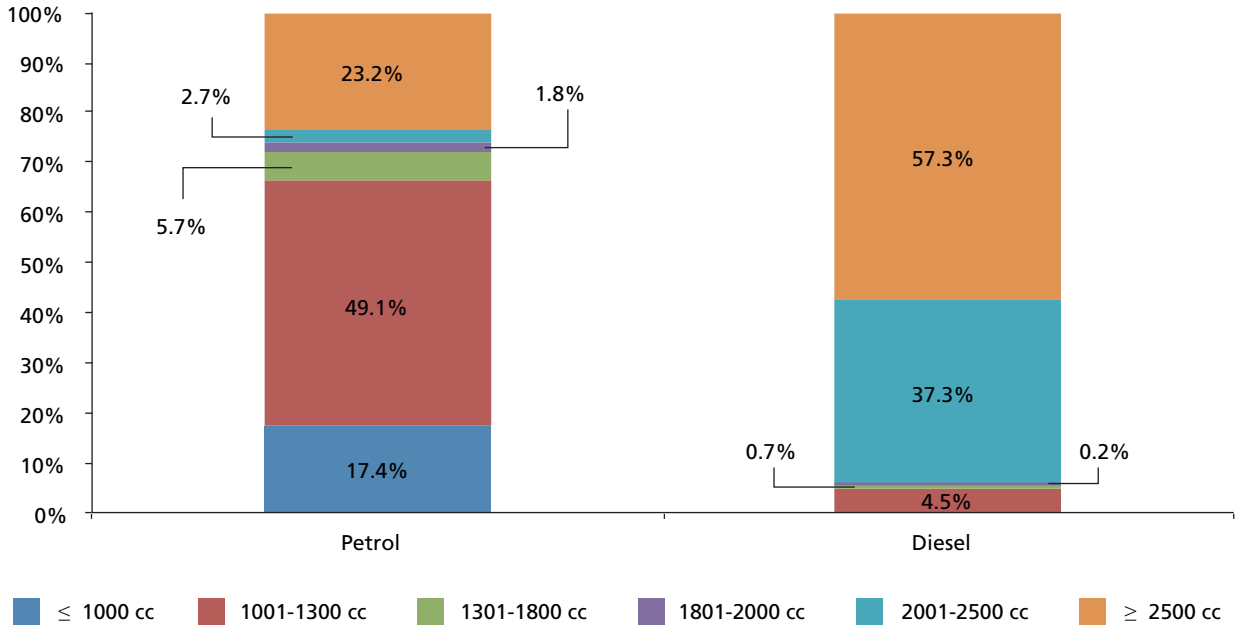
Data from studies carried out by Demiss Alemu of the Addis Ababa Institute of Technology and the Federal Transport Authority in 2012 show that dieselization is pushing the light-duty vehicles market towards bigger engine size that increases diesel consumption and emissions.

Analysis of the data shows that the country has more petrol light-duty vehicles in smaller engine size ranging from less than 1,000 cc to 1,801 and 2000 cc (more in the 1001–1300 cc category) compared to diesel light-duty vehicles. Diesel light-duty vehicles are more in the bigger-engine size in the range 2001–2500 cc to over 2500 cc category. Ninety-five per cent of the diesel light-duty vehicles are in the 2,001–2500 cc and greater than 2500 cc category. In contrast, only 26 per cent of petrol light-duty vehicles are in bigger engine category (see *Graph 21: Distribution of petrol and diesel light-duty vehicles by engine size in Ethiopia*).

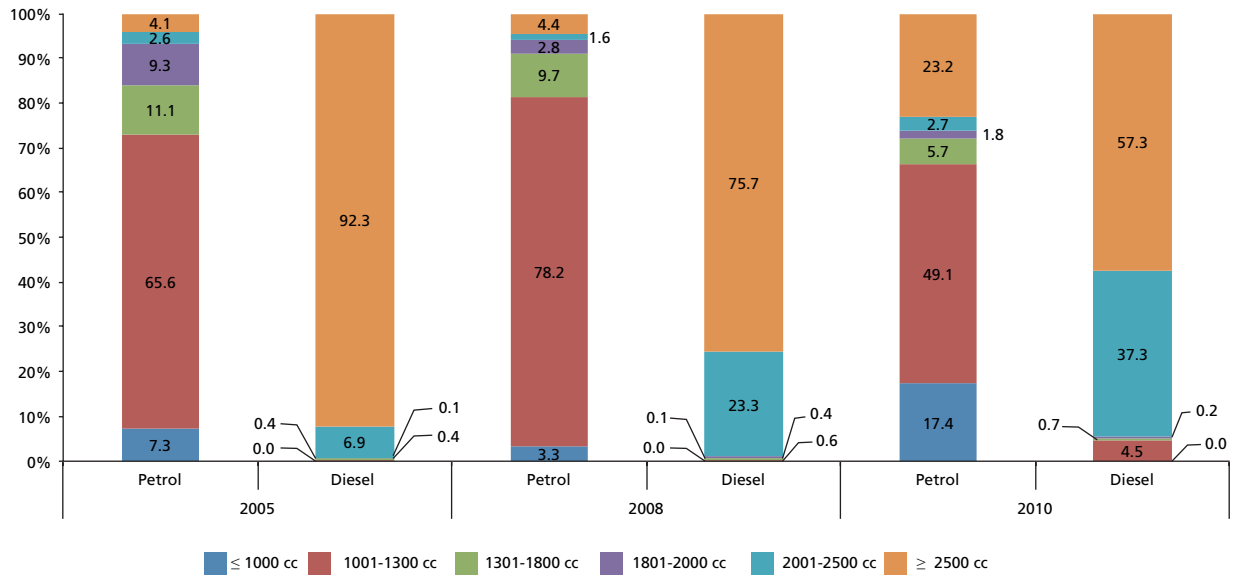
Further, there has been a steady increase in the share of diesel light-duty vehicles in the bigger engine size. The share in 2001–2,500 cc category has increased from 6.9 per cent in 2005 to 23.3 per cent in 2008 and 37.3 per cent in 2010. However, although light-duty vehicles in the greater than 2,500 cc category are still the highest among all the engine categories, they show a gradual decline over the years (see *Graph 22: Change in share of light-duty vehicles in different engine categories over time [2005–10]*).

Ethiopia, like other African countries, is dieselizing without clean diesel. This has serious implications for their air quality and public health.

Graph 21: Distribution of petrol and diesel light-duty vehicles by engine size in Ethiopia



Graph 22: Change in share of light-duty vehicles in different engine categories over time (2005–10)



Source for Graphs 21 and 22: CSE based on data from Demiss Alemu 2015, Baseline Setting for Vehicle Fuel Efficiency Improvement and CO_2 Emission, Paper presented at the Stakeholder Workshop on air quality and transportation challenges in Ethiopia and agenda for Clean Air Action Plan, Ministry of Environment and Forest, Federal Democratic Republic of Ethiopia and Centre for Science and Environment, Addis Ababa, 8 September 2015.

Used vehicles and heat-trapping gases

There are also serious concerns around the impact of motorization on energy security and heat-trapping gases. There is very little information available on the state of fuel economy of very old used vehicles. The literature sometime mentions that fuel efficiency of the vehicles may improve with age and usage. Some experts say that for a well-maintained vehicle, there could be little

Sidestepping polluting technologies with alternative fuel programmes

African countries have very limited alternative fuel programmes even though the fuel-substitution strategy is attractive in the developing world to circumvent the poor-quality mainstream fuels of petrol and diesel. Switching to cleaner fuels in the existing fleet can help lower emissions. There are a few prominent fuel-substitution programmes in Africa. These include the Compressed Natural gas (CNG) programme in Nigeria and Egypt and ethanol-blending programme in Ethiopia.

Nigeria has the world's ninth largest gas reserve. The Nigerian Gas Company (NGC) proposed the use of CNG as vehicular fuel in 1988 and introduced it in 1989. According to the Nigeria Independent Petroleum Company (NIPCO), over 4,000 vehicles had converted to CNG in Benin and over 500 CNG vehicles are also operating in Lagos. The launch of the Clean Energy Transport Scheme involves introduction of CNG-run vehicles and retrofitting of diesel engine to CNG. In Benin City of Edo state, over 50 per cent of taxi operators have converted to CNG. Use of natural gas instead of petrol translated into significant savings for taxi drivers in the area as Green Gas refuels over 4000 taxis and cars with natural gas and this is growing on a daily basis. According to UNEP estimates, if 40 per cent of vehicles in Nigeria switch to CNG, the government will save 28 per cent of foreign exchange spent on the import of 1.02 billion litres of fuels per year.[1]

Ethiopia, on the other hand, has adopted ethanol as a biofuel strategy in 2007 and produces biofuels from domestic resources as an import-substitution measure. Since October 2009, 5 per cent ethanol is being blended with petrol and the ratio has been increased to 10 per cent now. While the E5 blending started with one sugar factory and one blender company (Fincha and Nile Petroleum), E10 blending started March 2011 with two sugar factories and three blender campaniles (Fincha, Metehara and Nile Petroleum, Oil Libya and NOC). It is estimated that Ethiopia has saved around US $38.9 million over the past six years due to ethanol blending with petrol. Future plans are to increase the share of ethanol in blended fuel to 25 per cent and support the development of alternative fuels such as jatropha.

A similar fuel-substitution programme in Asian countries—including India, Bangladesh and Pakistan—has shown a substantial improvement in emissions. However, such programmes will have to be guided with adequate quality-control and emissions monitoring so that quality retrofits are possible.

variation and improvement in fuel consumption with age and an engine overhaul would result in an increase in fuel efficiency to the level it was earlier (before the repair or maintenance). Further, vehicle usage, driving and route characteristics, tyre pressure, passenger load and travel speed are other parameters that influence the vehicle fuel efficiency of on-road vehicles.

The UNEP background paper on used-vehicle import states that not all used vehicles are equally detrimental to air quality and fuel economy; used imported vehicles can be much cleaner and more energy efficient than existing stock. In fact, research conducted by the European Commission suggests that the majority of benefits in terms of fuel economy accrue to second owners of 'young used' (four–nine-year-old) cars.[20] Therefore, imported newer used vehicles have the potential to reduce emissions rather than the older used vehicles already in operation in low-income countries and with increased replacement overall emissions may reduce.

The ICCT explains that one of the key factors for fuel economy to remain constant or improve is reduced friction. This is especially pronounced for the first 5000–10,000 miles, but it actually continues for as long as the vehicle lasts, although the impacts decrease logarithmically. This is engine friction, transmission friction, axles, wheel bearings, pumps—anything that rotates. It also applies to tyres, but when the tyres get replaced it goes back to higher friction. So tyres are not part of the assessment.[21]

Also, malfunctions can reduce fuel economy. Newer vehicles rarely malfunction and are usually fixed when they do, but the older the vehicle gets, the more

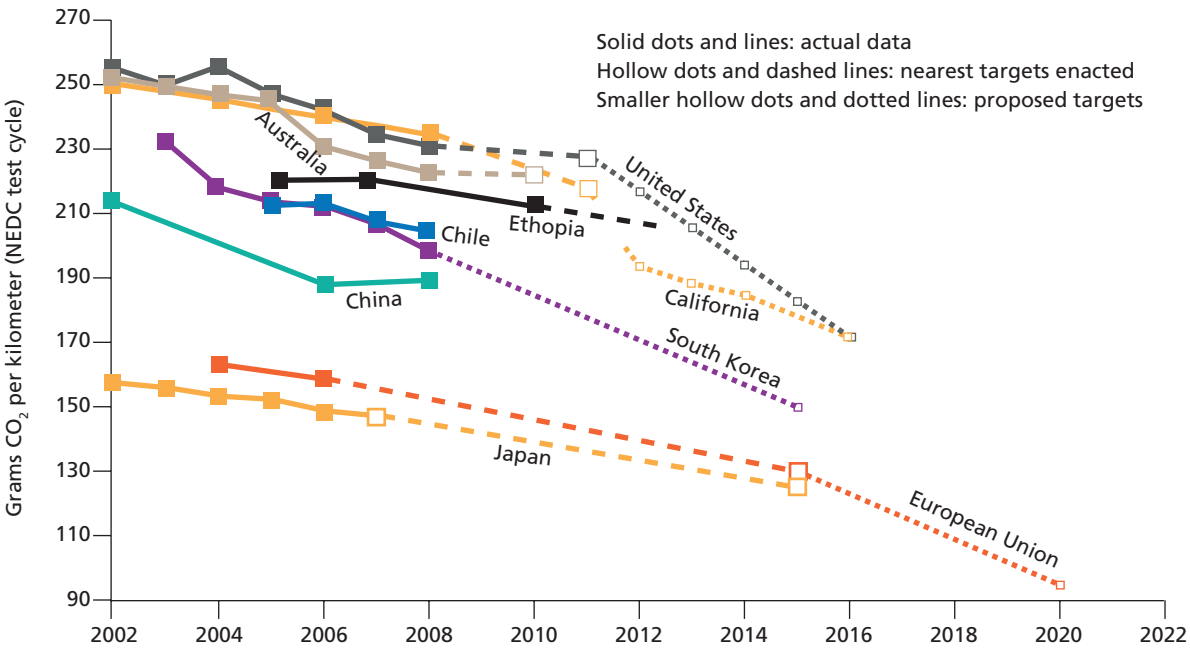
malfunctions occur and the less likely it is for the owner to fix it. And it really is mostly malfunction, not maintenance, that influences fuel economy. For example, a common perception is that a dirty air filter will reduce fuel economy. This was true back in the days before oxygen sensors, as a dirty air filter would restrict air flow and cause the engine to run rich, reducing fuel economy. But oxygen sensors pick up the air restriction and open the throttle a little wider to compensate, maintaining air/fuel ratio and fuel economy.[22]

The US EPA provides fuel economy labels for used vehicles. The EPA indicates on its website, 'As a vehicle's fuel economy changes very little over a typical 15-year life with proper maintenance, the original EPA fuel economy estimate remains the best indicator of a used vehicle's average gas mileage.'

Not much information is available about the fuel economy profile of the vehicular fleet. The study by Alemu of the Addis Ababa Institute of Technology shows that 0.3 million light-duty vehicles emit about 2.3 million tonnes of CO_2 per year. A study was done to set a baseline and develop a national vehicle database for indicating the fuel economy trend. The average fuel economy for light-duty vehicles in Ethiopia was found to be 8.4 l/100 km in 2005 and 2008 respectively and 7.9 l/100 km in 2010 with corresponding CO_2 emissions of 217, 221 and 212 g CO_2/km respectively.

Fuel economy slightly decreased to 7.9 l/100 km in 2010 with a corresponding increase in CO_2 emission to 212 g CO_2/km. Contrary to what is known from literature and experience, diesel light-duty vehicles in Ethiopia were found to have poorer fuel economy compared to petrol counterparts and emitted more CO_2 than petrol-fuelled vehicles. Alemu explained that these results are in a lower regime when compared to what is reported in the literature. This is because imported used vehicle have relatively larger share of vans, SUVs and pick-ups in the total import of light duty vehicles (see *Graph 23: Comparative average vehicle CO_2 emissions in Ethiopia and other countries*).

Graph 23: Comparative average vehicle CO_2 emissions in Ethiopia and other countries



Source: International Council on Clean Transportation

Used-vehicle import is steadily increasing the average mass of vehicles in the markets of importing countries as bigger engines dominate trade. This is noticeable across Africa and South Asia.

The countries of Africa and South Asia will have to adopt improved emissions standards and fuel economy-labelling together. Otherwise there can be a serious trade off. This is evident in the Mauritian market, where considerable emphasis has been put on CO_2 and fuel economy-based vehicle import without commensurate improvement in vehicle standards. Nearly 68 per cent of its vehicular stock is dieselized today.

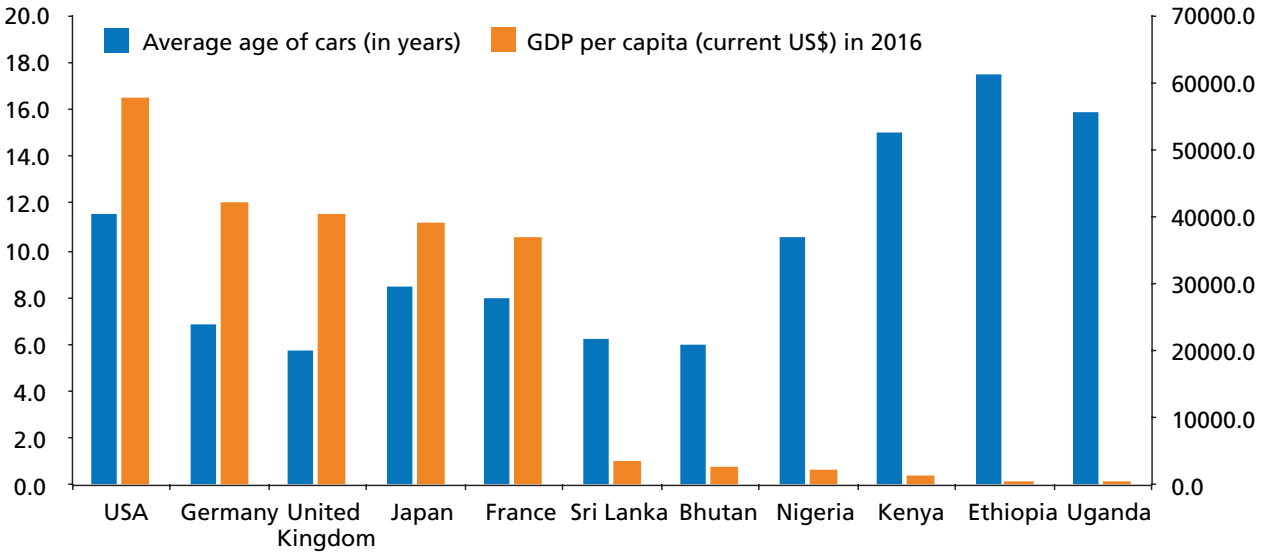
Environmental and fiscal regulations related to emissions of local pollution as well as heat-trapping gases from vehicles will have to improve significantly across Africa and South Asia to offset the negative impacts of import of used vehicles.

SECTION 4: Setting the terms for used-vehicle import

There is clearly a strong correlation between income levels of countries and average age of vehicles. The poorer the country, the higher is the average age of vehicles and vice versa. In the US, UK, Japan, Germany and France, countries with high per capita gross domestic product (GDP), the average age of light-duty vehicles is less than eight years, with exception of the US, where the average age is higher. But in countries of Africa and South Asia, with lower per capita GDP, the average age of vehicles is in the range of 12–17 years. This brings out the high import dependence on used vehicles in these countries and the fact that these vehicles also stay on the road for much longer period of time (see *Graph 24: Relation between per capita income and average age of cars in high- and low-income countries*)

Experts point out that as the majority of importing countries have adopted minimal policies on emissions and fuel standards and fuel economy standards to regulate their respective vehicle imports, the current international trade

Graph 24: Relation between per capita GDP and average age of cars in high- and low-income countries



Data compiled from:

- *The World Bank, GDP per capita (current US$), https://data.worldbank.org/indicator/NY.GDP.PCAP.CD*
- *Vehicles Getting Older: Average Age of Light Cars and Trucks in U.S. Rises Again in 2016 to 11.6 Years, IHS Markit Says, http://news.ihsmarkit.com/press-release/automotive/vehicles-getting-older-average-age-light-cars-and-trucks-us-rises-again-201*
- *Average age of road vehicles per country, European Environment Agency 2016, https://www.eea.europa.eu/data-and-maps/daviz/average-age-of-road-vehicles-6#tab-chart_1*
- *Average age of passenger cars in use in Japan from fiscal year 2007 to 2016 (in years), Statista – The Statistics Portal, https://www.statista.com/statistics/680051/japan-passenger-car-average-age/*
- *Rahul Goel 2015, Assessment of motor vehicle use characteristics in three Indian cities, http://www.urbanemissions.info/wp-content/uploads/docs/2015-06-TRD-India-Three-Cities-Veh-Characteristics.pdf*
- *Motorists in Asia replace their cars twice as often than motorists in the US, Sun Star, http://www.sunstar.com.ph/article/25473/*
- *Deloitte Africa Automotive Insights, https://www2.deloitte.com/content/dam/Deloitte/za/Documents/manufacturing/ZA_Deloitte-Africa-automotive-insights-Ethiopia-Kenya-Nigeria-Apr16.pdf*
- *UNEP 2017, Used Vehicle Global Overview, https://www.unece.org/fileadmin/DAM/trans/doc/2017/itc/UNEP-ITC_Background_Paper-Used_Vehicle_Global_Overview.pdf*
- *Jayaweera, Don S. Vehicle Inspection and Maintenance Policies and Programme – Sri Lanka, http://www.un.org/esa/gite/iandm/jayaweerapaper.pdf*
- *National Transport Policy of Bhutan 2017 – Policy Protocol Report (Final Draft), http://www.moic.gov.bt/wp-content/uploads/2017/08/Draft-Final-PPR.pdf (average age of taxis)*

in used vehicles between rich and poor countries has virtually reduced to an informal 'cash for clunker' programme 'where rich countries send used cars to poor countries and poor countries send cash to rich countries'.[1]

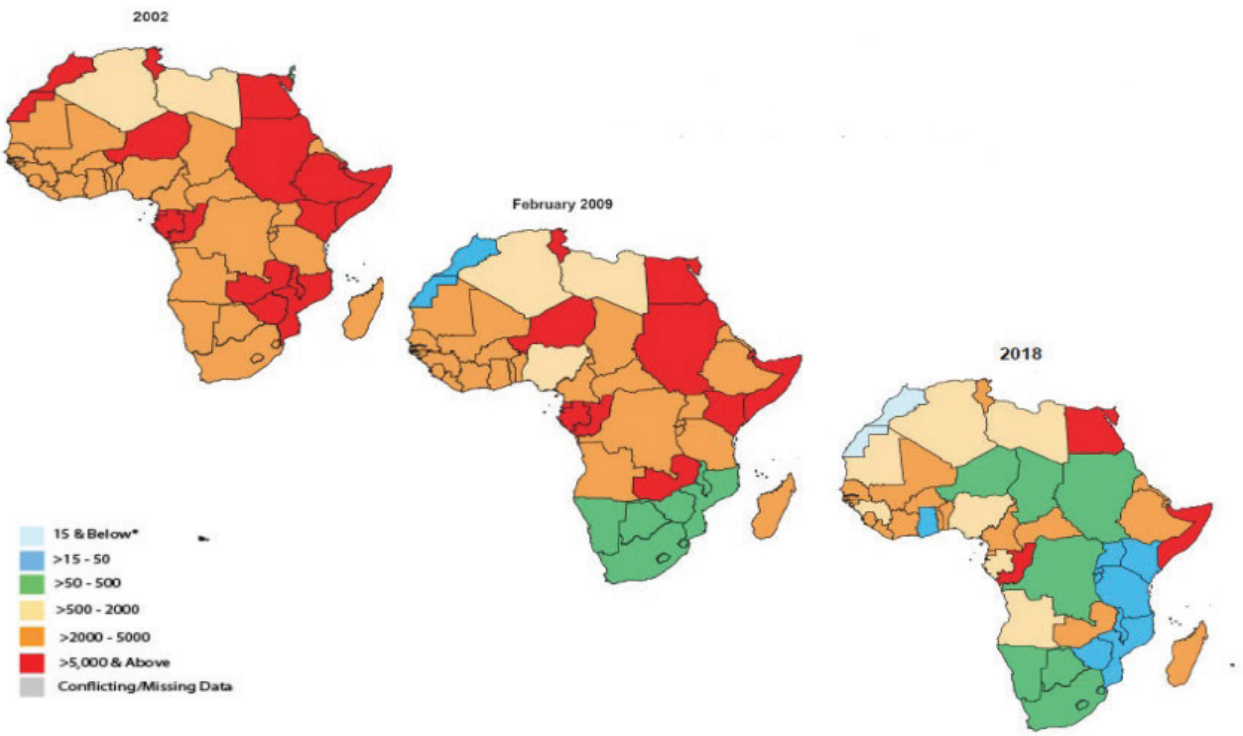
Low environmental safeguards enhancing vulnerability

Africa region: There is a considerable time lag in enforcement of improved emission standards for vehicles and fuel quality across the Africa region. These standards are not yet uniformly harmonized across the continent—this is blocking emission standards-based vehicle production and import in the region. On-road emissions monitoring is also weak.

UNEP has tracked the evolution in fuel quality and emission standards—it shows wide variance in the current standards across the Africa region. The constraint of poor fuel quality does not allow immediate harmonization of vehicle emission standards for either vehicle import or local production at the level of Euro IV emissions standards. However, there has been considerable progress in bringing 50 ppm sulphur fuels in South and East Africa that opens up the opportunity to introduce Euro IV emissions standards (see *Map 2: Africa progressing towards low-sulphur diesel* and *Map 3: Very few African countries have emission standards for vehicles*).

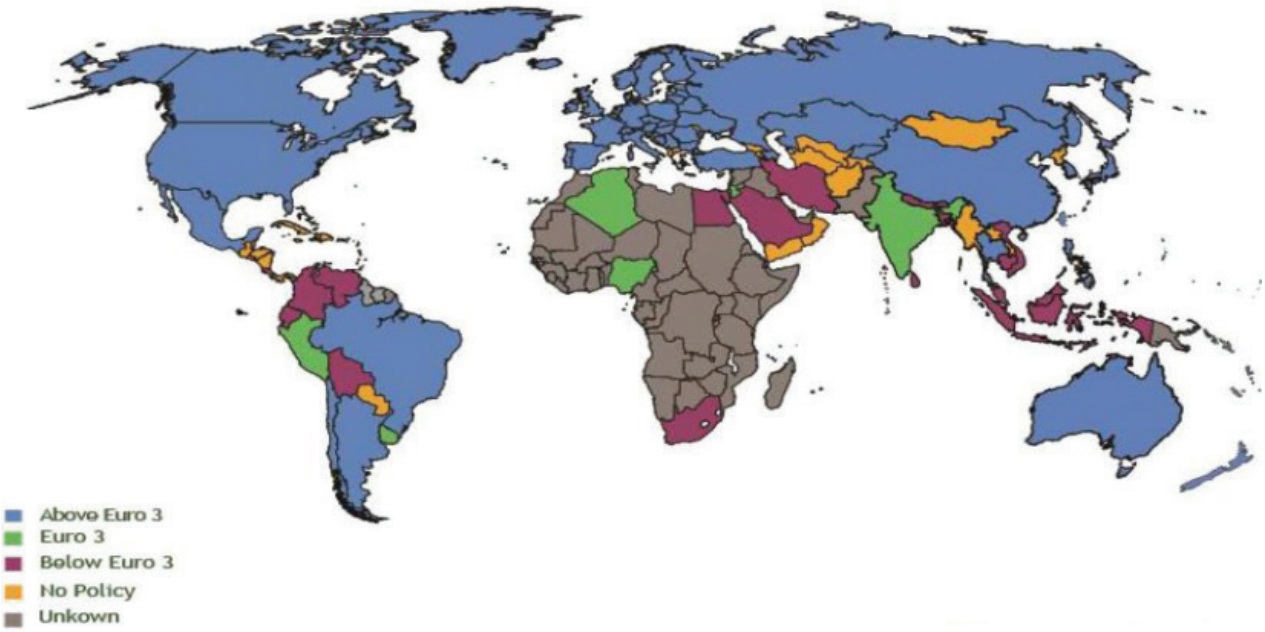
In southern Africa, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe have fuel quality with diesel sulphur levels in the range of 50–500 ppm.[2] Among these countries, Botswana, Lesotho, Namibia, South Africa and Swaziland are aiming for 10 ppm sulphur fuels. But the timeline is not clear. In West Africa, nearly all the countries have diesel sulphur in the range of 1,000–10,000 ppm.[3] In East Africa, Kenya, Uganda, Rwanda, Burundi and Tanzania have moved to 50 ppm since 2015. Morocco and Mauritius have met

Map 2: Africa progressing towards low-sulphur diesel



Source: Jane Akumu 2018, Progress towards cleaner fuels and vehicles in Africa, *Paper presented at the Africa Clean Mobility Week, Nairobi, 12–16 March 2018.*

Map 3: Very few African countries have emission standards for vehicles



Source: Jane Akumu 2018, Progress towards cleaner fuels and vehicles in Africa*, Paper presented at the Africa Clean Mobility Week, Nairobi, 12–16 March 2018.*

50 ppm sulphur fuels. Morocco is also the first country to adopt 10 ppm sulphur fuel. Nigeria has taken out the notification for 50 ppm sulphur diesel.

As fuel quality is languishing in most of the continent, progress on emission standards is slow. As of now, Algeria, Egypt and Rwanda have emission standards below Euro III.

Without the requisite fuel quality, it is not possible to link vehicle import with emission standards. Also, countries cannot take advantage of the newer fleet from the advanced markets as the poor-quality fuel will not allow operation of advanced emission-control systems. This is leading to massive downgrading and stripping of vehicle technology in the region.

South Asia: In South Asia, all the countries besides India, including Sri Lanka, Nepal, Bangladesh, Pakistan, Myanmar and Bhutan, are vehicle-importing countries. Some countries, including Sri Lanka and Pakistan, are now actively looking at promoting local assembly of vehicles.

Until recently, there was a considerable time lag in vehicle technology and fuel quality in this region. Vehicle-importing as well as vehicle-exporting countries were way down on the technology ladder. This has resulted in considerable flow of old and polluting vehicles towards the importing countries. But this scenario is changing rapidly now. India, as a vehicle-producing country, has graduated to Euro IV emission standards and is poised to move directly to Euro VI emissions standards by 2020. Nepal has already moved to Euro III emissions standards and is planning to align with India on Euro IV and Euro VI standards. Bangladesh that has adopted Euro I emission standards for diesel light-duty and heavy-duty vehicles and Euro II for petrol and CNG light-duty and heavy-duty vehicles is also contemplating a similar move.[4] Sri Lanka, and Bhutan are using innovative policies for a quick makeover.

These countries are simultaneously adopting several strategies to address vehicle imports that present a learning curve. But it is clear that only further tightening of the emissions regulations and benchmarks can help to reduce the vulnerability of these two regions and stem the tide of environmental dumping.

Key approaches to regulate vehicle import

Several regulations have evolved in Africa and South Asia that include fixing of age to ensure newer fleet is imported, fiscal measures to make import of vehicles more expensive and discourage very old vehicles, and emission-based taxation to import cleaner and more fuel-efficient vehicles.

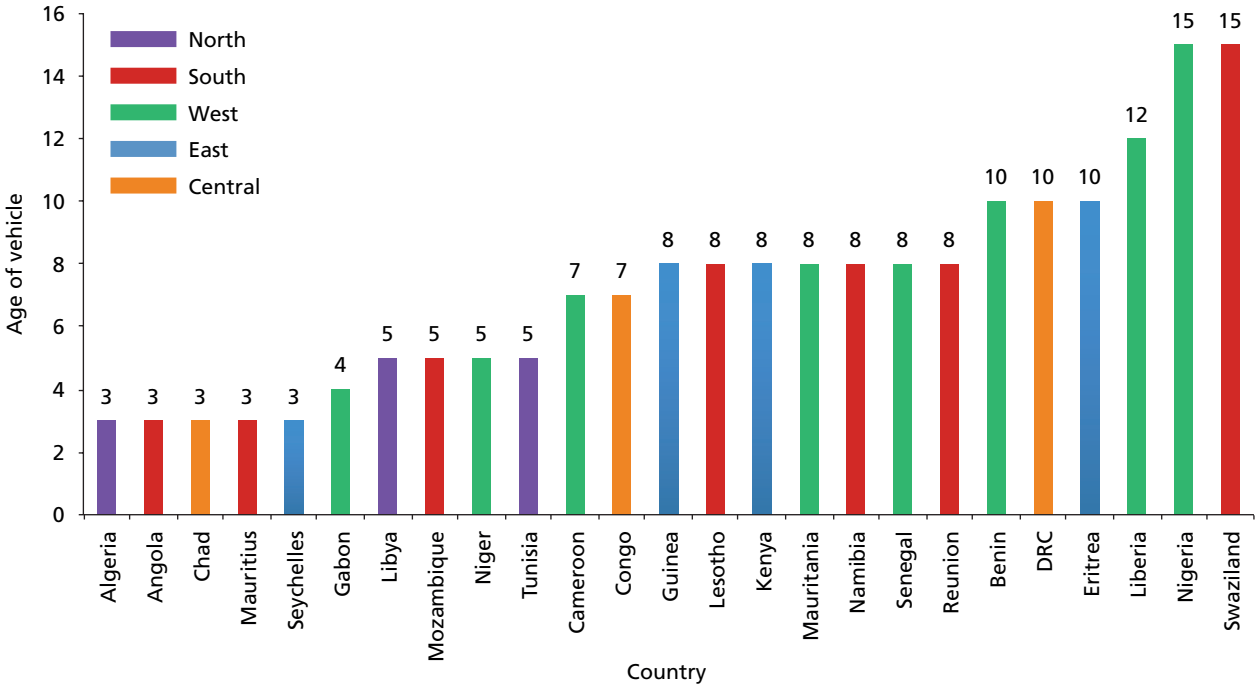
UNEP has done extensive classification of countries by type of measures they have adopted in Africa (see *Table 2: Vehicle-import regulations in Africa*).

Table 2: Vehicle-import regulations in Africa

Banned	Restricted by age		Incremental tax or additional excise duty on age		No import restrictions	No punitive import tariffs	No data
Egypt	Algeria	< 3 years	Kenya	> 3 years	Burkina Faso	Benin	Comoros
Morocco	Angola	< 3 years	Cape Verde	> 4 years	Burundi	Botswana	South Sudan
South Africa	Chad	< 3 years	Sierra Leone	> 4 years	CAR	Burkina Faso	Sao Tome and Principe
Sudan	Mauritius	< 3 years	Ghana	> 5 years	Côte d'Ivoire	Burundi	
	Seychelles	< 3 years	Tunisia	> 5 years	Djibouti	Cameroon	
	Gabon	< 4 years	Uganda	> 5 years	EQ. Guinea	CAR	
	Libya	< 5 years	Zimbabwe	> 5 years	Ethiopia	Chad	
	Mozambique	< 5 years	Tanzania	> 8 years	Gambia	Congo	
	Niger	< 5 years	Côte d'Ivoire	>10 years	Ghana	Comoros	
	Tunisia	< 5 years	Gambia	> 10 years	Guinea-Bissau	Djibouti	
	Cameroon	< 7 years	Liberia	> 10 years	Madagascar	DRC	
	Congo	< 7 years	Mali	> 10 years	Malawi	Egypt	
	Guinea	< 8 years	Rwanda	> 10 years	Mali	EQ. Guinea	
	Lesotho	< 8 years			Somalia	Gabon	
	Kenya	< 8 years			South Sudan	Guinea	
	Mauritania	< 8 years			Sierra Leone	Libya	
	Namibia	< 8 years			Tanzania	Madagascar	
	Reunion	< 8 years			Togo	Malawi	
	Senegal	< 8 years			Zambia	Mauritania	
	Benin	< 10 years				Mozambique	
	DRC	< 10 years				Niger	
	Eritrea	< 10 years				Namibia	
	Liberia	< 12 years				Reunion	
	Nigeria	< 15 years				Senegal	
	Swaziland	< 15 years				Seychelles	
						Somalia	
						South Sudan	
						Swaziland	
						Togo	
						Zambia	

Source: Ariadne Baskin 2018, Africa Used Vehicle Report*, Paper presented at the Africa Clean Mobility Week, Nairobi, 12–16 March 2018.*

Graph 25: Age-based used-vehicle imports by different countries



Source: Ariadne Baskin 2018, Africa Used Vehicle Report*, Paper presented at the Africa Clean Mobility Week, Nairobi, 12–16 March 2018.*

Imposing age restriction on imports

Fixing the age of vehicles for import and combining it with tax measures is the most common strategy. In Africa, while four countries, including Egypt, Morocco, South Africa and Sudan, have banned used-vehicle imports, another 25 countries have imposed age restrictions on vehicles. Age restrictions are three to 15 years (see *Graph 25: Age-based used-vehicle imports by different countries*). Algeria, Angola, Chad, Mauritius and Seychelles have capped the age at three years. Gabon, Libya, Mozambique, Niger and Tunisia have an age cap of five years and less. Lesotho, Kenya, Mauritania, Namibia and Senegal have capped the age at eight years. Benin and the Democratic Republic of Congo have capped it at ten years, and Liberia, Benin, Nigeria and Swaziland have capped age at 15 years.

Age-based taxation on imports

A large group of countries have linked higher taxes with age of vehicles. The objective of such incremental measures is to discourage import of very old vehicles and promote use and purchase of newer vehicles. This is also combined with vehicle inspection and pre-import inspection programmes.

These initiatives in different countries have thrown up different lessons and results.

Country-wise approach to regulate vehicle import

While broad approaches and strategies are common across the two regions, the specific country experiences have thrown up a wide gamut of lessons. Sharing these lessons is important as the countries are on their way to further refine their strategies to chart the future roadmap. In this review of country experiences, CSE has also put a more in-depth spotlight on Nigeria and Ethiopia (see *Boxes: Spotlight on Nigeria* and *Spotlight on Ethiopia*).

Uganda

There are over 1.5 million vehicles in Uganda of which nearly 30 per cent are motorcycles.[5] Over 85–95 per cent are used vehicles from Japan and Europe and are more than 10 years old.[6] Uganda does not have major vehicle assembling plants, only small ones.

Uganda has made four strategic interventions to improve their vehicle fleet—imposition of environment levy on used vehicles and higher taxes on bigger engines; vehicle-emission inspection; vehicle-age restriction; and pre-shipment inspection.[7]

Environment levy and higher taxes on older engines: The environment levy is designed to discourage importation of very old vehicles. It was started eight years ago, in 2010, and has been progressively revised. Used vehicles that are five to 10 years and above 10 years are required to pay 35 per cent and 50 per cent of cost, insurance and freight (CIF) value respectively as environmental levy. Goods vehicles (3.5 tonnes and above) are exempt. The environment levy favours import of less than five-year-old vehicles. Goods vehicles are excluded from the environment levy which is the biggest emitter, mainly because Uganda is a landlocked country without sea link and is heavily dependent on roadways.

Environment levy seems to have made some impact. In 2014–15, out of 51,629 imported vehicles, more than half (35,901) were used vehicles. But in 2015–16, the number of used vehicles came down to 18,922.[8]

However, according to Ronald Amanyire, Secretary, National Road Safety Council, Ministry of Works and Transport, Uganda, 'The policy in place to reduce importation of old vehicles is fiscal and may not necessarily achieve the objective of reducing importation of used vehicles over time. The policy is more of a tax policy to increase revenue to finance all government programmes.' Amanyire added that reduction in number of old vehicles imported and purchased by consumers do not necessarily lead to any significant corresponding increase in purchase of new vehicles. Affordable price of older vehicles remains a strong incentive.[9]

Officials observe that even if 50–100 per cent levy is imposed, an old vehicle remains cheaper than a new one. For instance, while used cars cost USh 10–20 million, a new car would be around USh 65 million.[10] Nathan Tumushabe, Senior Inspector of Vehicles, Ministry of Works and Transport, and Jennifer Kutesakwe, Senior Environment Inspector, National Environment Management Authority (NEMA), Uganda, say that new vehicles are still too expensive for most Ugandans to afford.[11]

Vehicle age: Uganda is also considering age restriction for vehicle import. The Traffic and Road Safety Act 1998 (Amendment) Bill 2018 proposes an eight-year age restriction from the date of manufacture and revision of environment levy. There was a discussion in Parliament to lower the age to eight years. Vehicle importers, transport associations and the general public protested. So a compromised position of graduated reduction was expected. The Parliament has now fixed 15-year age cap for vehicle import.

Vehicle emission inspection: Uganda has re-established mandatory vehicle inspection. Based on the NEMA/Uganda National BS guidelines, roadworthiness tests and emission standards enforcement is carried out. All vehicles come for inspection. At present emission results are not used to fail or pass a vehicle

as almost all vehicles are likely to fail. The purpose is to gather data to inform further policy decisions on vehicles, including vehicle age, fuel standard, maintenance procedure regimes etc. The regulation is yet to be enforced.

Pre-shipment inspection: The additional step is to introduce pre-Export Verification of Conformity (PVoC). The new pre-import new standard US845 specifies safety and performance characteristics of vehicles and their inspection and testing for roadworthiness. The PVoC requires exporters to apply for assessment of their exports for conformity with the new standard. A certificate of conformity (CoC) is issued to the exporters on passing the test and is valid for a year to be followed by another roadworthiness test.[12] Three firms are currently engaged for pre-shipment inspection of vehicles. Inspection is done in the country of origin as per the given manual of the Uganda standards, EAC standards, and international safety standards. A certificate of conformity and a certificate of roadworthiness and radiation levels is issued. Defaulters are fined 15 per cent of the CIF value.[13]

The problem of used-car import is increasingly drawing political attention in the country. Uganda's Environment Minister Frank Tumwebaze has been quoted in the media stating, 'The vehicles imported are largely old used vehicles with an average age of 16 years and instead of crushing them in Japan they say let us send them to countries like Uganda.'[14]

Lesson from Uganda: The learning from Uganda is that import taxes need to be designed more effectively in combination with age restrictions to make a difference. Otherwise, the tax measure will only degenerate to a revenue-generating strategy. Tax measures on their own cannot make new vehicles competitive. It is important to eliminate the old stream through regulations.

Kenya

A combination of age restriction and incremental tax has helped increase the overall price of imported vehicles and reduce demand. There are serious concerns regarding used-vehicle imports. Officials also point out that the older vehicles not only have higher emissions but also have poor safety standards that lead to accidents. Muitungu Mwai, Principal Compliance and Monitoring Officer and In Charge Air Quality Section, National Environment Management Authority, Kenya, says that used cars have lower power than newer ones, higher fuel consumption, higher exhaust emissions and higher operating costs, and create huge demand for second-hand spare parts that also drain scarce foreign exchange. These vehicles require frequent maintenance, repairs and replacement to restore them to near optimal conditions.[15]

Age restriction: Kenya does not allow import of vehicles older than eight years. This is enforced by the Kenya Customs Department as per the KS 1515:2000 quality standard of the Kenya Bureau of Standards. Kenya imposes incremental tax based on age of vehicles. Ayub Macharia, Director, Ministry of Environment and Natural Resources, Kenya, said that there was no import of used cars by the government.

Import tax policy: In September 2015, Kenya adopted an age-based taxation scheme for import of second-hand vehicles. Under this law, vehicles less than three years will pay 1,50,000 Kenyan Shilling (KSh) and more than three-year-old vehicles 2,00,000 Ksh. Peter Odhengo, Senior Policy Analyst, National Treasury Kenya, said that the roll-out of a new tax regime for imported used cars in 2015 has caused a massive retail price increase and the price increase resulted in

depressing the vehicles market in Kenya. The new taxes, which came into force in December 2015 following the amendment of the excise duty law, increased the prices of smaller vehicles and cut the cost of the luxury ones by up to 1.27 million KSh.[16] According to the Kenya Auto Bazaar Association, the higher taxes will increase the prices of the models by 1,45,000–3,64,000 KSh.[17]

Overall, five types of taxes are imposed on imported vehicles, including import duty (25 per cent of the CIF of the vehicle), excise duty (20 per cent of the CIF value plus import duty), VAT (16 per cent of the CIF value plus import duty plus excise duty), Import Declaration Fee (IDF) 2.25 per cent of the CIF value or KSh 5000 whichever is higher is payable. CIF is the customs value of the vehicle that includes the cost, insurance and freight paid for the vehicle. The CIF value of the vehicle is also deduced from the current retail selling price (CRSP) of the vehicle.[18]

Lesson from Kenya: While age regulations and increased taxes helped lower import of older vehicles, they still require a longer term strategy of improving emissions standards for vehicles (commensurate with the 50 ppm sulphur fuels already in place) for more sustained gains. At the same time, along with other countries, it needs to push for regional harmonization of rules related to vehicle import so that local action is not undercut by the grey market through its porous borders.

Used cars will begin to cost more if the regional air-pollution deal calling for lower age limit for import of used vehicles, and imposing minimum agreed emission standards and improved fuel quality at the regional level comes through. The President of Kenya, Uhuru Kenyatta, was reported saying at the United Nations Environment Assembly conference that he would host the East African Framework Agreement on Air Pollution and push for its implementation.[19]

Mauritius

Mauritius has adopted diverse strategies to regulate vehicle import, including age limit, emissions-based and engine size-based taxation. It has also adopted regulatory mechanisms for oversight and accountability that offer a rich learning curve.

Age cap and number controls: Mauritius has imposed age limit on all imported used vehicles. While used imported cars, SUVs and jeeps are required to be between 18 months and four years old, age limit for double cabs, 2 x 4 or 4 x 4, is between 18 months and three years. The age of goods vehicles cannot exceed six years; vans carrying goods and up to seven passengers four years; buses three years and motorcycles less than one year without any permission for resale. The reason for minimum age limit of 18 months is mainly to protect the new car industry.

There is as well quantitative control on imports of used vehicles. In case of cars, an individual is allowed one car every five years. A taxi owner is allowed one car every four years. There is no restriction on an authorized dealer. Motorcycles have a total import restriction for resale—only one motorcycle of less than a year as a gift or resettlement is allowed. For vans, buses, lorries and trucks, one vehicle every five years for each vehicle category respectively is allowed. This helps to also control the total volume of vehicles in this land-constrained country.[20]

CO_2 levy/rebate system: CO_2 levy/rebate system was introduced in July 2011 to reflect the Polluter Pays Principle in vehicle taxation. The Excise Act was amended in July 2011. The CO_2 threshold adopted for the purpose of taxation was 158 CO_2g/km. This was derived from the average emission values of the all new vehicles sold during the previous year based on the data obtained from importers. If the CO_2 emission of a vehicle was below 158 g/km, it was eligible for rebate and, if above, it had to pay a levy on the excise duty payable for that vehicle.[21]

This scheme was applied to both new and used cars, jeeps and SUVs. The CO_2-emission standard used initially was the United Nations Economic Commission for Europe Regulations 101 (UN-ECE Regulations no. 101) but as there was the problem of comparing standards for vehicles not tested as per European standards, the legislation was amended in 2013 to provide for other standards to be used for vehicles imported from other countries, including Japan, India and Korea.

The rebates were awarded in two categories. Vehicles with CO_2 emissions up to 90 g/km were awarded a rebate of Mauritian Rs 3,000 per gram for standard UN-ECE Regulation no. 101 and a lesser amount of Mauritian Rs 1,000 per gram for other standards. For vehicles complying with 91–150 g/km CO_2 emissions, rebate of Mauritian Rs 1,000 per gram for standard UN-ECE Regulation no. 101 and Mauritian Rs 350 per gramme for other standards was awarded. Vehicles which did not comply with CO_2 threshold were penalized and a levy was imposed (see *Table 3: CO_2 rebate and levy rates in Mauritius*).[22]

Unintended consequence of CO_2 levy/rebate system—increase in import of used cars: This scheme was expected to be revenue neutral, i.e. the amount of levy collected had to be more or less compensated for the amount of rebate paid. But financial analysis showed the opposite—the rebate amount had consistently exceeded the levy amount and this was highest in 2013 (see *Table 4: Yearly rebate and levy collection in Mauritius*).

Table 3: CO_2 rebate and levy rates in Mauritius

	Range g/km	Standard UN-ECE Regulations no. 101 (in Mauritian Rs/g)	Other standards (in Mauritian Rs/g)
Rebate	Up to 90	3,000	1,000
Rebate	91–150	1,000	350
Levy	151–190	2,000	
Levy	191–225	3,000	
Levy	226–290	4,000	
Levy	Over 290	5,000	

Note: A formula for computation of rebate or levy: A = Rx (C – T), where A is the amount of the CO_2 levy or rebate, R is the appropriate rate of the CO_2 levy or the appropriate CO_2 rebate per gramme per kilometre, C is the CO_2 gram per km of the car rounded to the nearest whole number and T is the CO_2 threshold in gram per km. For example, if the CO_2 emission of a car is 100 g/km the rebate will be Rs 50,000 for a UNECE Regulation no. 101 car or Rs 17,500 for other standards. So along with the CO_2 levy/rebate system there was an excise duty as well. So the excise duty was charged and from the excise duty amount either the rebate was deducted or levy added. So the paid amount was more than the prescribed excise duty if the vehicle emitted more than 150 g/km or 158 g/km as was initially or less than the excise duty if the vehicle qualifies for rebate.

Source: *MOEFD as quoted in Nassir Ally Khadun 2018, Roadmap for Clean Air, Paper presented at the Combating Dumping of Used Vehicles: Regional Consultation on Roadmap for Vehicle Import Policy in Africa and South Asia for Clean Air, Centre for Science and Environment, Zanzibar, 31 May 2018.*

Table 4: Yearly rebate and levy collection in Mauritius

Year	Rebate (in million Mauritian Rs)	Levy (in million Mauritian Rs)	Net (in million Mauritian Rs)
2012	360	106	-254
2013	549	93	-456
2014	302	108	-194
2015	348	93	-256

Source: MOEFD as quoted in Nassir Ally Khadun 2018, Roadmap for Clean Air, Paper presented at the Combating Dumping of Used Vehicles: Regional Consultation on Roadmap for Vehicle Import Policy in Africa and South Asia for Clean Air, Centre for Science and Environment, Zanzibar, 31 May 2018.

Corrective measures 2013: This led to corrective measures being taken in November 2013 that lowered the CO_2 threshold further from 158 to 150 CO_2g/km. In addition, for vehicles complying with UN-ECE Regulations no. 101 rebates were lowered from Mauritian Rs 3,000 per gramme to Mauritian Rs 1,000 up to 90 g/km and from Mauritian Rs 1,000 to Mauritian Rs 350 per gramme for levels within 91–150 g/km, i.e. the same rates as those applicable for second-hand vehicles.[23]

It again emerged from the 2015 data of Mauritius Revenue Authority (MRA) Customs that while the scheme was revenue neutral for new cars under UN-ECE standard, there was a financial deficit for used cars meeting other standards. Used cars that got a lower rebate were still benefiting more from the rebate scheme (257 million Mauritian rupees more) than new cars under UNECE (1 million Mauritian rupees) (see *Table 5: Analysis of 2015 data from MRA customs*). It was found later that because of dubious certification and false claims, used cars could show lower limits to corner the benefit of the rebate. This worked against new vehicles. It was clear that the CO_2 rebate/levy system was favouring used cars over new cars.

In 2013 and 2015, when there was a dip in the sale of new vehicle numbers, sale of second-hand vehicles increased.[24] There was sharp reaction from new-car dealers. Since the introduction of the CO_2 levy/rebate system, the sale of used vehicles increased significantly. Sale of used vehicles peaked in 2015 with a sharp decline in sale of new vehicles. There were representations from new car dealers to the MOFED with data indicating clearly that the scheme was promoting used cars over the more environmentally friendly new cars.

Table 5: Analysis of 2015 data from MRA customs

Cars with UN-ECE Regulations no. 101 standard	2015 (January–December)	
	Number	Amount (Rs million)
Levy	1,806	+83
Rebate	3,869	-82
Net		+1
Cars with other standards		
Levy	199	9
Rebate	7,463	266
Net		-257
Total Net		-256

Source: MOFED as quoted in Nassir Ally Khadun 2018, Roadmap for Clean Air, Paper presented at the Combating Dumping of Used Vehicles: Regional Consultation on Roadmap for Vehicle Import Policy in Africa and South Asia for Clean Air, Centre for Science and Environment, Zanzibar, 31 May 2018.

The reversal—introduction of excise duty restructure linked with engine size: A Committee was formed to look into the scheme for revenue neutrality and whether the threshold should be lowered further and also to look into the merit of abolishing the CO_2 rebate while keeping the CO_2 levy as was the case in South Africa and the UK. It was found that on the basis of dubious certification, used cars could show lower emission limits to get the benefit of the rebate.

It was also found that different standards for CO_2 emissions were used for the purpose of taxation and there was no formal arithmetical equivalence to compare those standards, and unreliable CO_2 values were used for computation of the levy or rebate.

The Budget of July 2016 led to the suspension of the CO_2based scheme due to operational and litigation glitches, which hindered its proper functioning. This suspension will remain valid until a harmonized CO_2 measurement becomes effective under the World Harmonized Light Vehicles Test Procedure.

After the suspension of the CO_2 levy/rebate scheme, the government restructured the excise duty based on engine capacity to control fuel guzzling (see *Table 6:*

Table 6: Rates of duty before 2016–17 Budget and excise duty rates before and after 2016–17 Budget in Mauritius

<table>
<tr><th rowspan="2">Type of car and cylinder capacity (cc)</th><th colspan="3">Rates prior to 2016–17 Budget</th><th rowspan="2">Rates of excise duty after 2016–17 Budget</th></tr>
<tr><th>Excise duty</th><th>Registration duty</th><th>Road tax</th></tr>
<tr><td colspan="5">Conventional cars</td></tr>
<tr><td>Up to 550 cc</td><td>15%</td><td rowspan="5">New and imported second-hand motor cars (first entry in Mauritius) pay the same rate depending on the cylinder capacity, ranging from Rs 3,300 to Rs 1,95,000.[1]</td><td rowspan="5">All cars (excluding hybrid and electric cars)
Rs 3500 to Rs 13,000 yearly depending on a cylinder capacity (company pays an additional amount Rs 1000/ Rs 2000)</td><td>0%</td></tr>
<tr><td>551–1,000 cc</td><td>55%</td><td>45%</td></tr>
<tr><td>1,001–1,600 cc</td><td>55%</td><td>50%</td></tr>
<tr><td>1601–2,000 cc</td><td>75%</td><td>75% (no change)</td></tr>
<tr><td>> 2,000 cc</td><td>100%[2]</td><td>100% (no change)</td></tr>
<tr><td colspan="5">Hybrid cars</td></tr>
<tr><td>< 550 cc</td><td>15%</td><td rowspan="4">50% of normal rate depending on engine capacity and age[3]</td><td rowspan="4">50% of normal rate depending on engine capacity</td><td rowspan="2">25%</td></tr>
<tr><td>551–1,600 cc</td><td>55%</td></tr>
<tr><td>1,600–2,000 cc</td><td>75%</td><td>45%</td></tr>
<tr><td>> 2,000 cc</td><td>100%[4]</td><td>70%</td></tr>
<tr><td colspan="5">Electric cars</td></tr>
<tr><td>Up to 180 Kw</td><td>25%</td><td rowspan="2"><table><tr><td>25.5 to 70 Kw</td><td>Rs 8100</td></tr><tr><td>70.1 to 95 Kw</td><td>Rs 16,300</td></tr><tr><td>95.1 to 125 Kw</td><td>Rs 26,000</td></tr><tr><td>125.1 to 150 Kw</td><td>Rs 32,000</td></tr><tr><td>150.1 to 180 Kw</td><td>Rs 39,000</td></tr><tr><td>>180 Kw</td><td>Rs 97,500</td></tr></table></td><td rowspan="2">50% of normal rate</td><td>0%</td></tr>
<tr><td>> 180 Kw</td><td>25%</td><td>25% (no change)</td></tr>
</table>

1 Subsequent transfer of vehicles on the local market depreciating rate

2 Plus CO_2 rebate if the CO_2 emission is less than 150 g/km. CO_2 levy if the CO_2 emission is more than 150 g/km

3 Subsequent transfer of vehicles on the local market: depreciating rate

4 Plus CO_2 rebate if the CO_2 emission is less than 150 g/km. CO_2 levy if the CO_2 emission is more than 150 g/km

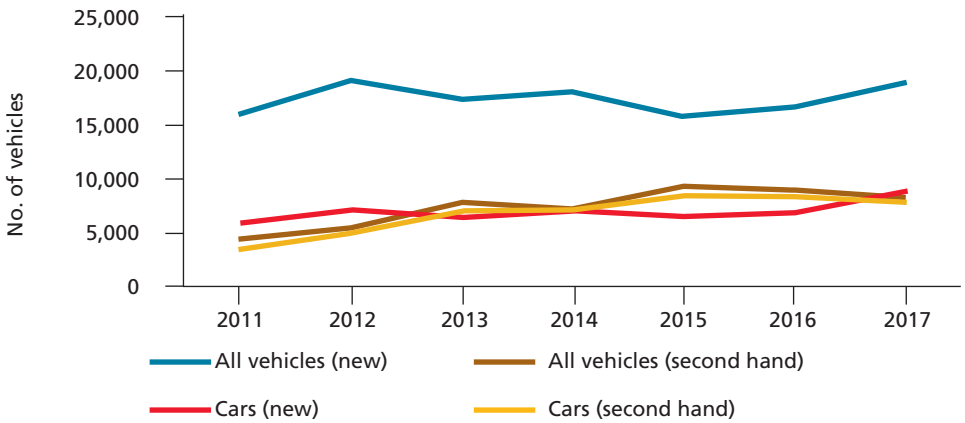
Source: MOEFD as quoted in Nassir Ally Khadun 2018, Roadmap for Clean Air, Paper presented at the Combating Dumping of Used Vehicles: Regional Consultation on Roadmap for Vehicle Import Policy in Africa and South Asia for Clean Air, Centre for Science and Environment, Zanzibar, 31 May 2018.

Rates of duty before 2016-17 Budget and excise duty rates before and after 2016–17 Budget in Mauritius.) The new rates give advantage to smaller engines. Cars up to 550 cc were exempt from excise tax. For cars of engine capacity 551–1,000 cc and 1,001–1,600 cc, excise duty has been reduced from 55 per cent to 45 per cent and 50 per cent respectively. However, for cars of 1,601–2,000 cc and above 2,000 cc, the excise duty remains unchanged at 75 per cent and 100 per cent respectively. Excise duty therefore is related to the engine capacity of cars and is higher for bigger cars. Thus, engine size became the proxy for CO_2 emissions.[25]

After 2016 new vehicles registration gained momentum with decline in second-hand vehicles (see *Graph 26: New and second-hand vehicles registration in Mauritius*).

Fiscal measures to promote hybrid/electric cars: The 2016–17 Budget announced excise duty favouring cleaner vehicles and significant lowering of excise duty for cars with low engine capacity and hybrid and electric cars. The share of hybrid/electric cars increased from 4 per cent in 2015 to 12.9 per cent in April 2017 (see *Table 7: Impact of Budget measures on hybrid and electric vehicles in Mauritius*).

Graph 26: New and second-hand vehicles registration in Mauritius



Source: CSE computed with data from Nassir Ally Khadun 2018, Roadmap for Clean Air, Paper presented at the Combating dumping of used vehicles: Regional Consultation on Roadmap for Vehicle Import Policy in Africa and South Asia for Clean Air, Centre for Science and Environment, Zanzibar, 31 May 2018.

Table 7: Impact of Budget measures on hybrid and electric vehicles in Mauritius

Year	Total number of vehicles registered during the year	Share of cars (all types of cars)	Share of hybrid and electric cars to total number of vehicles	Share of hybrid and electric cars to total number of cars
2011	20,463	46.8%	0.8%	1.6%
2012	24,654	49.6%	1.6%	3.2%
2013	25,371	54.2%	2.7%	5.0%
2014	25,556	55.0%	1.7%	3.1%
2015	25,149	60.3%	2.4%	4.0%
2016	25,766	59.1%	5.3%	8.9%
2017 (Jan–Apr)	8,900	57.1%	7.4%	12.9%

Source: National Transport Authority as quoted in Nassir Ally Khadun 2018, Roadmap for Clean Air, Paper presented at the Combating dumping of used vehicles: Regional Consultation on Roadmap for Vehicle Import Policy in Africa and South Asia for Clean Air, Centre for Science and Environment, Zanzibar, 31 May 2018.

Other fiscal measures promoting cleaner vehicles

While new and imported used cars (first entry in Mauritius) have to pay the same registration duty depending on the engine capacity ranging from Mauritian Rs (MUR) 3,300 to MUR 1,95,000 (depreciating rate on subsequent transfer of vehicles in the local market), the registration duty for hybrid cars was 50 per cent of the normal rate depending on the engine capacity and age (depreciating rate on subsequent transfer of vehicles in the local market) and for electric cars from 25.5 kW up to 180 kW ranged from MUR 8,100 to MUR 39,000 and MUR 97,500 for electric cars more than 180 kW.

The registration duty has been reduced for electric cars with engine power up to 180 kW and fewer thresholds/bands of engine power (13 bands of engine power revised to only six bands). To promote hybrid cars, excise duty was lowered on all engine categories from 55 to 25 per cent for up to 1,600 cc hybrid cars, from 75 to 45 per cent for 1,601–2,000 cc cars and from 100 per cent to 70 cc for above 2,000 cc hybrid cars. The government has exempted all electric cars up to 180 kW of excise duty (it was 25 per cent earlier) and there is no change (25 per cent) for electric cars above 180 kW.[26]

The structure of the road tax also favours vehicles of low engine capacity as well as hybrid and electric vehicles.

Setting systems for verification for imported vehicles: Mauritius has set up an elaborate system for checks and verification that presents a good learning curve in the region. For second-hand vehicle import, a series of documents are required—including import permit; inspection certificate from a competent authority to certify that the vehicle has been inspected not earlier than two months prior to shipment, the vehicle is not stolen, roadworthiness and usability of the vehicle and the auction grade where the vehicle is imported from Japan; a document from the exporting country certifying that the vehicle is not stolen; a deregistration certificate and an export certificate issued by the official registration body; and a certified copy of the original auction sheet for second-hand vehicles from Japan to protect consumers.

Obligation of vehicle dealers and accountability: Mauritius has also detailed the legal obligation of the car dealers that helps improve accountability. Authorized dealers need to be registered and licensed with the Ministry of Industry, Commerce and Consumer Protection, own a showroom for display of cars, provide the Ministry with a bank guarantee or security for an amount of MUR 2.5 million (approx. US $75,000), allow purchasers to test drive vehicles, produce vehicle inspection certificate to purchasers, hold spare parts and repair facilities for vehicles imported and sold, enter into a sale agreement with the purchaser setting a warranty period for the car sold and submit to the relevant Ministry a certified copy of the sale agreement within three days showing that the agreement has been executed. Its up to the authorized dealer to effect all the repairs free of charge and provide any purchaser a vehicle in a good roadworthiness state otherwise the Ministry has the power to compensate the purchaser from the bank guarantee.

A lot of attention has been given to extending consumer protection from import of damaged vehicles. This became necessary when it was detected after the tsunami in Japan, when many cars affected by flooding were recovered, washed, drained and exported from Japan. To counter such problems, warranties are asked for from the competent certification authorities in exporting countries.

They have to give a guarantee of US $1,00,000 to state that the certificate issued is a genuine and credible one.[27]

Lessons from Mauritius: Mauritius throws up important lessons. It has simultaneously imposed age cap, restraints on frequency of vehicle purchase, and emissions-based taxation that was subsequently replaced by engine size-based excise tax. Yet, among these progressive measures, emissions-based taxation faced barriers. It led to unintended consequences of pushing up sale of older and used vehicles even though the rebates were lower for these vehicles compared to newer vehicles. First of all there was technical and administrative challenge of enforcing emissions-based taxation as the emissions standards of different countries of origin was not directly comparable. Imposition of emissions-based taxation requires globally harmonized systems to enable comparability of emissions standards in exporting countries. It is not often within the management capability of importing countries such as Europe and Japan to establish technically sophisticated systems to govern such imports. Documentation to enable implementation of such system is also extremely complex. This led to enormous leakages, especially while importing used vehicles, as dubious certificates made false claims of fuel economy or CO_2 emissions. This increased sales of used vehicles, leading huge fiscal deficit instead of keeping the programme revenue neutral. Also, the subsequent engine size-based regulations has been found to be more transparent, viable and easily enforceable within the administrative capacity.

In future, with global harmonization of regulations, it might still be possible to revert to CO_2- or fuel economy-based regulations. But this requires a word of caution. Only CO_2-based regulations without commensurate improvement in emissions standards for vehicles may lead to market distortion in favour of diesel cars. Mauritius could avoid such a pitfall as the price gap between petrol and diesel fuels is very narrow, taxes on bigger engines are much higher and consumer preference is in favour of petrol cars. But this may not be the case in other countries.

Yet another lesson from Mauritius is its effort to set up elaborate institutional processes to establish accountability of the car dealers and a verification process to ensure roadworthy vehicle imports.

Ghana

Challenge of used vehicle trade: Used-vehicle import far exceeds new-vehicle import. In 2015–17, out of the total 336,947 vehicles imported, about 221,096 (65.62 per cent) were used vehicles. In 2017, the revenue accrued from vehicle import accounted for more than half of the total revenue mobilized by the Customs Division of the Ghana Revenue Authority.[28] The Ghana Revenue Authority Customs Division is responsible for imposing import duties/taxes on vehicles in accordance with the revised Harmonized System and Customs Tariff Schedules—2012.[29]

Officials point out that most of the used vehicles that find their way into Ghana are salvaged vehicles that are accident prone and have less efficient engines. They are often refurbished by the local mechanics to look as good as new vehicles. The influx of these salvaged vehicles cause traffic congestion in cities of Accra, Kumasi and Secondi Takoradi.

According to the Ghana Revenue Authority, most vehicles lack proper documentation as they are smuggled into the country through unapproved

routes. Vehicles imported temporarily are mostly not re-exported but fictitiously registered; vehicles in transit to neighbouring countries make a U-turn and end up being registered in the country.[30] People take advantage of the 90-day protocol of Economic Community of West African States (ECOWAS)—under which imported used vehicles are allowed to operate for 90 days only after which they are either returned to their country of origin or if they would like to remain in Ghana they have to pay customs duty—but this does not happen, to evade tax payment. ECOWAS has allowed this to enable interregional transit of vehicles. Media reports that vehicles are deliberately brought from Nigeria, Togo and Benin and not sent back at the end of the three-month ECOWAS Protocol, with Ghana license plates are used illegally.[31] Apparently, people buy overage or accident-affected cars of the make, model and type that are not more than ten years old and neatly cut off the VIN of car and weld it on the old car so as to avoid overage penalties.

Age restriction: The Customs Act 2015 (ACT 891) is the law governing importation of vehicles into Ghana. Sections 55–61 of the Customs Act 2015 (ACT 891) constitutes the principal legislation governing vehicle import. The age of a vehicle imported under the law is calculated from the year the vehicle was manufactured. In June 1998, the government of Ghana had placed a ban on the importation of vehicles over ten years old.

Penalty system: Following the amendment of Customs Excise and Preventive Service (CEPS) Act 634 in 2002, the ban was lifted and replaced with the imposition of high import penalty on cars exceeding ten years old. The penalties were further increased in 2015. Penalties are imposed on some category of overage vehicles in addition to any applicable duties and taxes (see *Table 8: Penalties on importation of overage vehicles in Ghana*). Although the purpose of the amendment (penalties on used vehicles importation) was to deter buyers/consumers, it rather gave them an even greater freedom than the total ban on the importation of used cars older than 10 years.[32]

Tax according to engine size: Ghana has also introduced higher import taxes on vehicles with bigger engines. Tax is higher on cars exceeding 1,900 cc engine category (ranging from 5 per cent, 10 per cent and 20 per cent). They also have an age-based taxation system for imported vehicles. In addition, a 0.5 per cent of ECOWAS levy is charged on vehicles. Import duty is dependent on the vehicle fuel type and engine capacity (see *Table 9: Vehicles with higher engine capacities attract higher duty rates in Ghana*).

Emmanuel Appoh, Head of Environmental Quality Department, Standards, Compliance and Enforcement Division, Environmental Protection Agency, Ghana, said that the tax regime has helped reduce import of conventional vehicles and more vehicles less than 10 years are being imported by the private sector. An Economic Community of West African States (ECOWAS) levy of 0.5 per cent is also charged on imported vehicles and vehicle with higher engine capacity pay more taxes. The ECOWAS communiqué is destined to bring down the import of vehicles of less than eight years. However there is no regulation on importation of used engines and other spare parts.[33]

Ghana has implemented the ECOWAS low-sulphur-fuel initiative as a mechanism to reduce sulphur levels in fuels since September 2017.

Lesson from Ghana: The experience of Ghana shows that penalty on overage vehicles without actual age restriction may not be very effective in curtailing

Table 8: Penalties on importation of overage vehicles in Ghana

S. no.	Vehicle type	Penalty
1.	Car	
a.	Age does not exceed 10 years	Nil
b.	Age exceeds 10 years but does not exceed 12 years	5% of CIF value
c.	Age exceeds 12 years but does not exceed 15 years.	20% of CIF value
d.	Age exceeds 15 years but does not exceed 25 years	50% of CIF value
e.	Age exceeds 25 years but does not exceed 35 years	70% of CIF value
f.	Age exceeds 35 years	100% of CIF value
2.	Commercial vehicles—bus, coach or van	
a.	Age does not exceed 10 years	Nil
b.	Age exceeds 10 years but does not exceed 12 years	2.5% of CIF value
c.	Age exceeds 12 years but does not exceed 15 years	10% of CIF value
d.	Age exceeds 15 years but does not exceed 20 years	20% of CIF value
e.	Age exceeds 20 years but does not exceed 25 years	50% of CIF value
3.	Commercial vehicles—truck, lorry or tipper truck	
a.	Age does not exceed 10 years	Nil
b.	Age exceeds 10 years but does not exceed 12 years	5% of CIF value
c.	Age exceeds 12 years but does not exceed 22 years	10% of CIF value
d.	Age exceeds 22 years	30% of CIF value
Pages 108–09 (date of gazette notification: 18 May 2015)		
The age of a vehicle shall be calculated from the year in which the vehicle was first manufactured		
No person shall import a right-hand steering vehicle into the country unless otherwise authorized by the Minister of Transport		
Under the current law (Act 634) any vehicle that remains un-entered and un-cleared within 60 days after discharge or in case of overland vehicle, from the date it crossed the national border into Ghana shall be forfeited to the state		

Table 9: Vehicles with higher engine capacities attract higher duty rates in Ghana

S. no.	Vehicle type	Import duty
1.	Car	
	Petrol cars	
	Cylinder capacity not exceeding 1,000 cc	5%
	Cylinder capacity exceeding 1,000 cc and up to 3,000 cc	10%
	Cylinder capacity exceeding 3,000 cc	20%
	Diesel cars	
	Cylinder capacity not exceeding 1,500 cc	5%
	Cylinder capacity exceeding 1,500 cc and up to 2,500 cc	10%
	Cylinder capacity exceeding 2,500 cc	20%
2.	Goods vehicles	
	All trucks, including all off-highway dumpers	5%
	Special purpose vehicles (towing trucks, crane trucks, fire-fighting vehicles, drilling rig trucks, cesspool/cesspit emptier, etc.)	5%
	All vehicles when imported knocked-down (CKD) for assembly industry	5%
3.	Machinery and equipment	
	All earth-moving equipment such as bulldozers, excavators, forklifts, graders, backhoe loaders	5%

Source for Tables 8 and 9: Baba Bukari Musah 2018, Import Vehicle Policy Related Initiatives of Ghana, Paper presented at the Combating Dumping of Used Vehicles: Regional Consultation on Roadmap for Vehicle Import Policy in Africa and South Asia for Clean Air, Centre for Science and Environment, Zanzibar, 31 May 2018.

import of very old vehicles. However tax measures have helped reduce import of very old vehicles to some extent. But the grey market can undercut such efforts. Moreover, documentation of vehicles remains dubious and therefore proper verification becomes a challenge. This is a learning that is emerging across Africa.

Rwanda

In Rwanda, excluding motorcycles, 56.7 per cent of all vehicles are pre-1999 and 77.2 per cent are pre-2005.[34]

Fiscal strategy: There is no age restriction on imported vehicles. In order to discourage old vehicles, car depreciation factor is applied on taxes. Rwanda implemented the East African Community (EAC) depreciation schedule through a free-on-board depreciation rate ranging from 20 per cent for two-year-old cars, 75 per cent for nine-year-old cars and 80 per cent for 10-year-old or more cars.[35]

This strategy has helped make older cars more expensive. This for instance has resulted in doubling of the price of most preferred Toyota cars. The Rwanda Revenue Authority noted a drop in car import by around 20 per cent after introduction of this system. New vehicles with engine capacity less than 1,500 cc pay a 5 per cent tax; vehicles with engine capacity 1,500 cc pay, those with 1,500 cc and 2,500 cc capacity pay 10 per cent, and those with over 2,500 cc engine capacity pay 15 per cent. Despite the heavy tax burden slapped on used cars, demand is still high.[36]

Vehicle inspection: The law also mandates that all vehicles need to undergo emissions inspection at vehicle inspection centre. All commercial and public transport vehicles have to undergo inspection twice a year and other vehicles—such as private, public and even utilities—do so once a year. Non-compliant vehicles are not allowed to ply.[37]

Lessons from Rwanda: It is clear that taxes will have to be progressively revised to moderate the demand. Fiscal measures will have to be backed by age restrictions. Rwanda needs to consider more stringent measures to control used- vehicle import as it is also planning to set up its local assembly of vehicles. It is reported that companies like Volkswagen have plans to set up a local assembly plant.

Zimbabwe

Zimbabwe's vehicular fleet size in 2016 was 1.2 million. Vehicles are imported largely from Japan, Europe and UK.[38] During 2000–17, Zimbabwe reduced imports that resulted in a shift to imports of second-hand vehicles at the expense of the local assemblers and local component manufacturers. Second-hand vehicles hampered local industry. Affordable price is the reason for influx of second-hand vehicles. While the price of importing a second-hand vehicle is in the range of US $3,000–7000, the price of a new vehicle of the same make is in the range of US $10,000–20,000. The new-vehicle market has shrunk from 20,000 vehicles per year in 1997 to less than 3,154 in 2017.[39] Thus, local manufacturing is nearly decimated.

Age restriction: In 2011, a ban on aged vehicles was initially mooted in view of safety and environmental considerations, on vehicles over five years old but this could not be implemented due to public pressure.[40]

Fiscal strategy: The charges levied on vehicle imports include customs duty, surtax and VAT. Vehicles with large engine capacity have to pay high customs

duty—86 per cent customs duty for vehicle of less than 1,500 cc capacity and 96 per cent for those exceeding 1,500 cc capacity. Other measures include appointment of international certification agency Bureau Veritas to conduct the Consignment Based Conformity Assessment (CBCA) in order to reduce hazardous and substandard imported products and improve customs duty collection. Bureau Veritas has been appointed by the Ministry of Industry and Commerce of Zimbabwe for the verification and assessment of conformity of goods in exporting countries. Since 27 July 2015 all products (including automotive and transportation and others) regulated by the Ministry of Industry and Commerce exported into Zimbabwe must be accompanied by a CBCA certificate.[41]

Promoting local industry: The Zimbabwe Motor Industry Development Policy (ZMIDP) aims to encourage both local and foreign direct investment in the local automotive assembly and components manufacturing to 10 per cent of total foreign direct investment by 2026 and exports to be 50 per cent of total local production by 2026. It seeks to increase capacity utilization of car assemblers from the current levels which is less than 10 per cent to 100 per cent of installed capacity by 2026. ZMIDP is also looking at getting banks to offer credit terms to buyers for locally made new vehicles.[42]

Lessons from Zimbabwe: The key lesson here is that countries that are promoting local vehicle assembly as an economic measure for investment and job creation will have to protect this market from import of old and used vehicles. Moreover, both local assembly and imports will have to be linked to improved emissions standards, fuel quality and quality control. Yet another lesson is that one of the toughest barriers to reducing import of very old vehicles is consumer pressure as there is strong demand for very cheap vehicles. This will require significant public awareness.

Côte d'Ivoire

During 2010–17, Côte d'Ivoire registered 0.45 million vehicles. As much as 89 per cent of these were used vehicles. According to Gnamien Stéphane Meney, Ministry of Environment, and Dembélé Diakaridja, Ministry of Transport, Côte d'Ivoire, the age-wise vehicle import data of 2010–17 shows that 31 per cent of vehicles are in the age group of zero to five years, followed by 14 per cent in the age bracket of six to ten tears. But 55 per cent are over ten years old.[43] This is threatening the air quality of its city of Abidjan.

Age restriction: On 6 December 2017, Côte d'Ivoire adopted two decrees—Decree No. 2017-792 limiting the age of imported second-hand vehicles and Decree No. 2017-793 fixing the operating periods of vehicles used for public or private transport of persons or goods. The two decrees limit the age of imported used vehicles to five years from the date of registration. This also specifies the average operating period of vehicle at seven years from the first date of entry into circulation. This will come into effect from July 2018.[44] Kone Nagnonta, Head of the Bureau Summary Report and Statistics, Ministry of Transport, Côte d'Ivoire, said that the age limit for commercial vehicle segments are as follows—taxis (five years), mini buses with nine to 34 seats (seven years), trucks and buses (ten years), and tourist vehicles (five years). Earlier, the average age of imported used vehicles was about fifteen years.[45]

Fiscal strategy: In Côte d'Ivoire, import of vehicles is governed by a law that imposes a contributory fee (US $300) on road safety, congestion and pollution from vehicles. This contributory fee is imposed on ten-year-old passenger and

freight vehicles with total permissible gross weight less than or equal to 4 tonnes and 15 years for goods vehicles with a gross vehicle weight of more than 4 tonnes.[46] Vehicles over ten years old are also charged extra duty.[47]

Vehicle inspection: There is an obligation on vehicles traveling in Côte d'Ivoire to undergo a technical inspection to guarantee the safety status of goods and people. This is a pre-importation inspection for road worthiness.

Lesson from Côte d'Ivoire: This is a unique example in which the government has linked an additional fee on import of old vehicles to the guiding principles of road safety, congestion and pollution. These operative principles have helped impose stronger tax measures to curtail import of very old vehicles. Yet another important progressive step is the government's decision in 2012 to keep the price of diesel and petrol the same. It is also recognized that diesel vehicles are more polluting.

Tanzania

According to 2016 registration data, Tanzania has a registered vehicular fleet of about 0.3 million excluding motorcycles and tricycles. Of these, only 4.5 per cent are new vehicles. About 12.4 per cent vehicles are one to eight years old and 83 per cent vehicles are over eight years old.[48]

Age restriction: Tanzania has not enforced age restriction yet.

Fiscal strategy: Tanzania has adopted the policy of additional excise duty that increases with age of vehicles. For instance, vehicles aged eight to ten years pay 15 per cent additional excise duty; those over 10 years pay 30 per cent; and used imported buses over five years old pay 10 per cent. This is also backed by the two-slab taxation based on engine size. Vehicles up to 1000 cc do not pay excise duty. But thereafter, vehicles with engine capacity below 2,000 cc pay 5 per cent and those exceeding 2,000 cc pay 10 per cent (see *Table 10: Tax rates for imported vehicles in Tanzania*).

Vehicle registrations show a marked decline after 2014 in Tanzania (see *Graph 27: Import of vehicles excluding motorcycles and tricycles for five years [2012–16] in Tanzania*).[49]

Lessons from Tanzania: Tanzania is another country that has adopted fiscal measures without age restriction. It seems to have had some impacts on import. To maximize impacts, combining age restrictions with harsher fiscal measures will help. Otherwise, as seen in other countries, very cheap old vehicles will always undercut market for new and cleaner vehicles.

Mozambique

Age restriction: The government is finding it increasingly difficult to impose restrictive policies on used-vehicle import as this draws public opposition. In the absence of adequate public-transport policy, dependence on small vehicles and cars is enormous. A law was introduced in 2007 to discourage old and used vehicle import but there was public opposition. Officials feel that in the absence of public transport, it is not possible to prohibit importation of vehicles, even used vehicles, which even with an extra tax are cheaper than new vehicles.

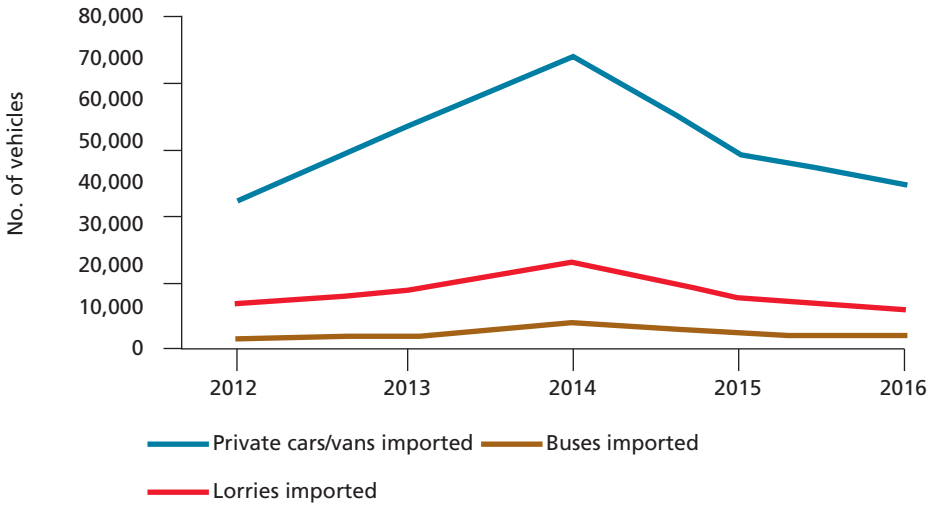
Fiscal strategy: Mozambique has adopted single-window clearance for customs and importation of goods in 2011. The tax on used vehicles varies from 5 per cent to 20 per cent. There is no age limit on vehicles but an extra tax is

Table 10: Tax rates for imported vehicles in Tanzania

S. no.	Tax	Amount
1.	Import duty	25%
2.	VAT	18%
3.	Excise duty based on engine capacity	
3a	Cylinder capacity less than 1,000 cc	0%
3b	Cylinder capacity exceeding 1,000 cc but not exceeding 2,000 cc	5%
3c	Cylinder capacity exceeding 2,000 cc	10%
4	Additional excise duty on imported used vehicles	
4a	Imported vehicles, excluding agricultural tractors, from eight years of age but not more than 10 years, counted from the year of manufacture	15%
4b	Imported vehicles aged 10 years or more, counted from the year of manufacture	30%
4c	Used buses more than five years old from the year of manufacture	10%
5	Excise duty on imports of used vehicles spare parts	
5a	Imported used spare parts for vehicles and motorcycles	25%

Source: Stephen Samwel Malekano et al. 2018, Tanzania, Paper presented at the Combating Dumping of Used Vehicles: Regional Consultation on Roadmap for Vehicle Import Policy in Africa and South Asia for Clean Air, Centre for Science and Environment, Zanzibar, 31 May 2018.

Graph 27: Import of vehicles excluding motorcycles and tricycles for five years (2012–16) in Tanzania



Source: Stephen Samwel Malekano et al. 2018, Tanzania, Paper presented at the Combating Dumping of Used Vehicles: Regional Consultation on Roadmap for Vehicle Import Policy in Africa and South Asia for Clean Air, Centre for Science and Environment, Zanzibar, 31 May 2018.

Table 11: Vehicle taxation for imported vehicles in Myanmar

Engine Displacement	Custom duty (in per cent)	Special goods tax (in per cent)	Commercial tax (in per cent)
1500 cc	30	-	5
1,501–1,800 cc	30	20	5
1,801–2,000 cc	30	20	5
2,001–4,000 cc	40	30	5
> 4,000 cc	40	50	5

Source: Soe Tun, 2017, Automobile Industry in Myanmar, Myanmar Automobile Manufacturer and Distributor Association (MAMDA)

imposed from seven years onwards to discourage importation of used vehicles. They have a stratified tax system based on engine size. Bigger engines attract higher taxes.[50]

Lesson from Mozambique: Like other countries, Mozambique is facing the dilemma of public aspiration that blocks action on very old and cheap cars. It is, however, important that the government has recognized the link between the lack of public transport and increased dependence on old and cheap cars for personal travel and therefore public opposition to harsh measures against used-vehicle import. In fact, the government is encouraging import of three-wheelers from India and China to increase public-transport service. An affordable train service has been introduced for workers this year.

Zambia: Vehicle-import policy status for Zambia

In Zambia, Road Traffic Act no. 11 of 2002 provides for two types of registration processes—temporary for vehicles imported and manufactured in Zambia, and permanent registration for all vehicles in Zambia. Zambia currently has no vehicle-manufacturing plant. So all vehicles registered are imported either brand new or used. Zambia currently has a total vehicle population of around 748,468 (public and private) as at first quarter, 2018. This excludes the vehicles for the government and intelligence wings. About 85 per cent of these registered vehicles are imported used vehicles. Vehicles are brought into the country either by individuals or motor-vehicle dealers. Vehicle and trailer registration requires recording of details in the national vehicle register.

Vehicle import is regulated by organizations such as the Zambia Bureau of Standards (ZABS), which regulates the road worthiness of vehicles before shipment by appointed agencies, for example JEVIC, Zambia Revenue Authority (ZRA) for taxation purposes, INTERPOL for clearance of vehicle for lawful entry, Road Transport and Safety Agency (RTSA) for examination, registration and licensing of vehicles and Zambia Environmental Management Agency (ZEMA) for environmental pollution (carbon emissions surtax).

The import requirements vary for new and used vehicles. For new vehicles invoice, road manifest or bill of lading as the case may be, export bill of entry from the country of export is required. The valuation of new vehicles is based on the World Trade Organization Agreement valuation method and duties and taxes are applied on an ad valorem basis. New vehicles have to pay import duty; import VAT, excise duty and vehicle registration fee.

In the case of used vehicles, in addition to invoice, road manifest or bill of lading as the case may be, export bill of entry from the country of export, JEVIC Inspection Certificate required by the Zambia Bureau of Standards and Interpol Clearance are also required. The duties and taxes on used vehicles are specific and based on the age and type of vehicles. The tax amounts are legislated and therefore known to the importer and customs broker. In addition, vehicle registration fee and carbon emissions surtax are also payable.

Demand for used vehicles is high because of limited disposal income and lack of vehicle-assembly plants. Cheaper used vehicles allow households/businesses to own vehicles. According to the Nkanga Shimwandwe, Deputy Commissioner, Customs Services, Zambia Revenue Authority, Chrispin Simwanza, Principal Inspector and Head—Air and Noise, Zambia Environmental Management Agency, and Joseph Mumba, Principal Registration Officer, Road Transport and Safety Agency, Zambia, ownership of used vehicles has high maintenance costs

due to frequent breakdowns. This compromises road safety as these vehicles are often not roadworthy. There is also the propensity to wrongly declare the age of the motor vehicle to lower tax rates.[51]

Currently, older vehicles attract higher duties and taxes. The feeling is that short-term policy options need to be micro-finance facilities to enable public and private entities to procure new vehicles, strengthening pre-shipment road worthiness assessments. This requires changes in the current import duty and excise tax treatment for imported vehicles. This should be further supported by age cap on imported vehicles. The medium to long-term policy options are strengthening of public transport system, introduction of non-motorized transport system and incentives for establishment of vehicle-assembly plant. Therefore implementation of clean vehicle importation policy is important for cleaner environment and improved road safety. This will require clarity, efficiency and transparency, and reduce corruption in vehicle importation.[52]

Lesson from Zambia: The experience of Zambia brings out the importance of linking tax measures with age cap. Currently they have imposed higher taxes on older vehicles which is a right principle. But without a robust monitoring system and weak documentation the system can be compromised by underreporting age of vehicles. Enforcement is a challenge. Moreover, as the officials point out, it is also important to come up with fiscal incentive structures to encourage people to buy newer vehicles that are more expensive.

Swaziland

Fiscal measures: Swaziland has imposed a three and six per cent levy on used non-Southern African Customs Union (SACU) vehicles imported from Dubai and those subsequently shipped elsewhere in the Middle East and Asia.

This levy to be implemented in April has been imposed on all vehicle import from outside the region in terms of Legal notice number 35 of 2018. Three per cent levy of the total value will be imposed on six- to ten-year-old vehicle and a six per cent levy on 11–15-year-old vehicles. According to vehicle dealers, the levy will increase the vehicle prices and lead to a drastic decline in Dubai-vehicle sales as buyers will prefer SACU-produced vehicles.[53]

South Asia

Among the countries of South Asia, Afghanistan, Bangladesh, Bhutan, Myanmar, Maldives, Nepal, Sri Lanka and Pakistan are vehicle-importing countries. These countries have limited vehicle-assembly capacity. India is a vehicle-producing country and an exporter of fuel and vehicles. The South Asian market is unique as it is confined to the contiguous geography of Asia. Japan, China and India are key exporters in this region. India and China do not export used vehicles legally. But anecdotal evidences suggest that there is grey market in used vehicles from India through its porous borders to neighbouring countries.

Improvement in emissions regulations in the key exporting countries of Asia. India, China and Japan can thus have profound impacts on markets across South Asia and rest of Asia. Japan is already a frontrunner in vehicle technologies. India and China are also quickening steps to meet the Euro VI benchmark. This creates enormous opportunity for the rest of the region to align and allow upward harmonization and counter the threat of dumping.

All countries in South Asia have already begun to take effective steps to regulate and improve the benchmark for vehicle import to reduce emissions

Table 12: Emission and fuel-quality standards in South Asia

Countries	Fuel quality (sulphur level in fuels)	Vehicle emissions standards
Vehicle-importing countries		
Bhutan	50 ppm	Euro II
Pakistan	500 ppm	
Nepal	50 ppm	Euro III
Sri Lanka	500/800–1,000 ppm (local production 3000 ppm) Super-diesel 4 star: 10 ppm (very limited supply in Colombo)	Euro II
Bangladesh	500–5000 ppm	Euro II for petrol and CNG light-duty vehicles; Euro I for diesel light-duty and heavy-duty vehicles
Vehicle-exporting country		
India	50 ppm and 10 ppm sulphur	Euro IV emissions standards for all vehicles 2020: Euro VI emissions standards for all vehicles

Sources:

M. Absar Alam, 2015, Paper presented at the Vehicle Fuel Economy and Emission Standards, National Stakeholder Consultation and Capacity Building Workshop On Development of Sustainable and Inclusive Transport Policy, 9–10 April 2015, http://www.unescap.org/sites/default/files/16%20Vehicle%20Fuel%20Efficiecy%20Standards.pdf)

The World Bank, 2014, Cleaning Pakistan's Air, http://documents.worldbank.org/curated/en/701891468285328404/pdf/890650PUB0Clea00Box385269B00PUBLIC0.pdf

Ministry of Population and Environment DEPARTMENT OF ENVIRONMENT (DoEnv), 2017, Air Quality Management Action Plan for Kathmandu Valley, http://doenv.gov.np/files/download/Report%20on%20AQM%20Action%20Plan%202017.pdf

Clean Air Asia, 2016, Vehicle Inspection and Maintenance in Asia Policy Profile: Sri Lanka, http://cleanairasia.org/wp-content/uploads/2016/08/CountryProfile_SriLanka.pdf

and improve fuel economy. There is still substantial variation in emissions standards and fuel quality regulations as well as vehicle import regulations across the region (see *Table 12: Emission and fuel-quality standards in South Asia*). These differences still block regional harmonization. Several countries in South Asia, including Bangladesh, India and Pakistan have also leveraged a compressed natural gas programme with emissions benefits.

Experience and action in selected countries provide insight into the way roadmap is taking shape in the region.

Bangladesh

Dhaka has adopted a vehicle-import policy to improve vehicular emissions. Several steps have been taken to restrict import of old vehicles and weed out old and polluting vehicles from its own fleet. Around 80 per cent of the cars on the road of Bangladesh are imported from Japan. Importation of used cars, used jeeps, used microbuses, used minibus, including other old vehicles, and tractors are allowed.[54]

Age restriction: The vehicle-import policy has fixed the age of vehicles at not more than four years. Import of used vehicles is only allowed from the country of origin and not from a third country. A certificate issued by the Japan Auto Appraisal Institute (JAAI) must contain the age, model number and chassis number of the used car. That certificate is submitted to the customs authority. Age is calculated from the first day of the next year of manufacture of

Spotlight on Nigeria

The challenge of used-vehicle import: Till 2013, Nigeria had about 5.7 million registered vehicles and was fourth in Africa, after South Africa, Algeria and Egypt.[1] One third of country's vehicles are concentrated in Lagos state alone. A 2016 report of PricewaterhouseCoopers Limited (PwC), called *Africa's Next Automotive Hub*, shows that only 11 per cent of second-hand cars are equal to or less than five years old; 26 per cent are in the age bracket of 6–11 years; 50 per cent are in the 12–18 years age bracket and 13 per cent are over 19 years. Thus, overall 89 per cent are over five years old.

Used-vehicle import is also pushing the market more towards larger and older vehicles that guzzle more fuel. Vehicle-segment-wise analysis of used vehicles data by PwC shows 35 per cent are large cars, 24 per cent SUVs, 22 per cent small cars and the remaining are pickup and commercial vehicles. Even though the majority of cars come from the US, Japanese cars dominate.

The large number of old and used vehicles have aggravated the problem of pollution and road safety in cities of Nigeria. In fact, as per the records of the Federal Road Safety Corps, Nigeria (FRSC), and as shared by Efosa Peter Osawe, Corps Safety Engineering Officer, there are evidences at FRSC to prove that these old vehicles represent 80 per cent of the vehicles involved in road traffic crashes. Many of them are with faults that were recalled in the countries of origin. This requires serious attention as Nigeria is motorizing steadily.

Nigeria is an important example in Africa that, though swamped with imported old vehicles, is gearing up to control this flow effectively to build its own industry. In 2012, as per the records of the Nigerian Customs Service, over 75 per cent of its vehicles were imported used vehicles.[2] This influx had led to shutting down of 75 per cent of car and truck assembly plants in the country.[3] Increasing manufacturing costs and customer demand for cheaper and a variety of brands were responsible.

Nigeria anticipates that the growing demand for imported vehicles in the populous country can have destabilizing effect on their balance of payments. This needs to be offset by setting up vehicle-manufacturing facilities. Nigeria had started to promote local assembly during the 1970s and 1980s, when the Federal government set up state-owned plants across the country. It drew up agreements with European carmakers such as Peugeot Nigeria Ltd, Styer Nigeria Ltd and National Truck Manufacturers, Volkswagen of Nigeria, Leyland Nigeria Ltd etc. But during 1990 and 2013, this process declined, coinciding with growing oil imports. This led to the government divesting its interest in several companies, undermining local assembly. There is a new policy now to revive the local car industry.[4] A PwC study in 2016 has projected that Nigeria will generate 6 million new cars by 2050, when consumer preference for new cars will increase and as a result demand for used car import will decline—from 70 per cent of import currently to 35 per cent in 2028, and die out by 2034.[5] Used cars, or *Tokundo*, will however continue to dominate until 2025.

Step towards local manufacturing: The government of Nigeria is now adopting strategies to build the local assembly. The government has approved the New Automotive Industry Development Plan to curtail total dependence on import.[6] The three existing auto clusters in Nigeria are Lagos-Ogun-Oyo, Kaduna-Kano and Enugu-Anambra. Nigeria has also set up state-of-the-art vehicle test centres with the help of the Automotive Research Association of India, where automotive products can be tested to confirm with standards and vehicle homologation. The NADDC is collaborating with the standards organization of Nigeria to develop 200 vehicle safety and component standards and also align with ISO quality certification. It is also setting up auxiliary industry. They are also revamping the vehicle roadworthiness inspection system.

Tightening of tax measures for vehicle import: One of key strategies to support this initiative is to adopt tougher policies on vehicle import. The Nigerian government is increasing the cost of import. Fiscal policy is being designed so that it helps create an environment in which existing assembly plants survive and grow, and incentivizes incorporation of local components. The fiscal measures, which include a sliding scale of tariffs and levies, came into effect in July 2014 for import substitution. The NADP sets the tariff at a maximum of 70 per cent (35 per cent duty plus 35 per cent levy) for fully built-up cars and 35 per cent duty without levy for commercial vehicles in the first place. This level is expected to decrease only after the sector grows competitive. Completely knocked down parts (CKD) and semi-knocked down parts (SKD) for assembling will be charged 0 per cent, and 5–10 per cent duty[7] (see *Table: Progressive change in import tariff, 2014–15 to 2017–18*). Previously, importers and car dealers paid 20 per cent duty along with a 2 per cent levy on cars. As much as 70 per cent tariff on fully built imported vehicles has been implemented in January 2015. Vehicle purchase credit is also being promoted to encourage purchase of locally assembled new vehicles.

Fiscal measure makes impact on vehicle imports: During the last three years, vehicles imported from Europe, Asia and the

Progressive change in import tariff, 2014–15 to 2017–18

Year	Objective	Incentive
2014–15	Allow existing assembly plants to survive and attract other OEMs	i) Cars: Levy of 35% charged on car FBU in addition to 35% duty ii) Commercial vehicles: 35% duty without levy iii) Tariff on CKD, SDK1 and SDK 2: 0%, 5% and 10% local assembly plants iv) Assembly plants to import FBU at 35% and 20 per cent duty without levy for cars and commercial vehicles respectively in numbers equal to twice their imported CKD/SKD kits
2019–24	Institute incentive for local content incorporation	i) Levy on FBU car reduced to 20%. Tariff remains at 35%. ii) Duty on commercial vehicle FBU remains at 35% without levy iii) Tariff on CKD, SKD remain at 0%, 5% and 10% respectively iv) Concessionary FBU import by APs to be up to half of their imported CKD/SKD kits
2016–18	Allow existing assembly plants to grow and attract more OEMs and local content supplier	i) Levy on FBU car reduced to 20%. Tariff remains at 35%. ii) Duty on commercial vehicle FBU remains at 35% without levy iii) Tariff on CKD, SKD remain at 0%, 5% and 10% respectively iv) Concessionary FBU import by APs to be up to half of their imported CKD/SKD kits v) Concessionary FBU import by APs to be equal to their imported CKD/SKD kits

Source: National Automotive Design and Development Council, 2017, Information documents on the Nigerian Automotive Industry Development Plan, Federal Ministry of Trade and Investment.

US have reduced by 81.25 per cent or the equivalent of Nigerian naira (NGN) 490.5 billion. According to Nigerian Ports Authority (NPA) data, the country imported 73,000 vehicles worth NGN 109.5 billion (or 18.25 per cent of the 400,000 units it previously imported) in 2017. Imports are expected to reduce further as only eight vessels were laden with 3,210 units of used vehicles in January 2018. While Nigeria imported more than 100,000 cars per year from the US, imports from the US in 2015 declined to less than 40,000 units. Toyota Nigeria's share of imports dropped to 38 per cent in 2016 (43 per cent in 2015). According to Toyota (Nigeria) in Lagos, forex and high interest rates were also challenges of bringing vehicles into the country. Car imports have dropped by about 60 per cent between 2015 and 2016.

High import duty on vehicles might have reduced import of used vehicles, but there are concerns around vehicles being smuggled from neighbouring countries such as Benin, which impose low import tariff. Since 1 July 2017, Benin has reduced the amount charged for vehicles in transit. Thus, the price to clear a car discharged in Cotonou in transit to Nigeria has been slashed from CFA 3,99,920 (Naira 257,000) to CFA 2,90,000 (Naira 186,000). In order to mitigate the risk of smuggling, the customs authorities from Benin and Nigeria have intensified efforts to collaborate and work towards full compliance with the Economic Community of West African States (ECOWAS) trade agreements.

The Nigeria Customs Service (NCS) plans to introduce a uniform value on vehicles imported into the country to curb diversion to neighbouring ports and under-declaration at various ports and borders. The NCS needs to publish the price of new vehicles annually and provide a transparent benchmark to determine the value of used vehicles.

In 2017, the National Automobile Design and Development Council (NADDC), however, said it would not ban the import of used vehicles. The ban would only take full effect when a robust vehicle finance scheme (to be launched by 2018 end) was available to enable citizens to buy brand new vehicles. The NADDC plans to work closely with other stakeholders to address the sector's challenges and promote initiatives that would enable it to produce affordable vehicles that would ease the country's mass transport challenges. The NADDC is working on a plan with the Standards Organisation of Nigeria (SON) to introduce compulsory issuance of roadworthy certificates on all used vehicles to be imported into Nigeria from their countries of origin.

Other measures: The government has formed the National Environmental (Control of Vehicular Emissions from Petrol and Diesel Engines) Regulations, 2011. This has led to a ban on import of two-stroke engines, prohibition of motor vehicles without installed approved emission reduction technology, penalty for violators and annual testing of vehicles for toxic gas emissions. The government has approved the National Vehicular Emission Control Programme (NVECP) to be run on a Public Private Partnership, which involves establishment of vehicle-emission testing centres nationwide, annual testing of vehicles for emissions and collection of data.

Emissions standards and fuel quality: Nigeria has come up with a notification to introduce 50 ppm sulphur diesel and 150 ppm sulphur gasoline. This is likely to be implemented in 2019. But a unique strategy in Nigeria is that diesel fuel is priced higher than gasoline fuel. This has worked effectively to stop dieselization of cars.

Lessons from Nigeria: Nigeria sets a clear example of ramping up tighter controls on imports as it has explicitly linked the objective of promoting its own vehicle industry, primarily to protect its balance if payment. Nigeria has an additional advantage in its oil and gas reserves. Thus, developing its oil and vehicle industry works for its economy. The industrial policy has therefore encouraged tougher import taxes that have helped to reduce imports substantially.[8] But as the lesson from across Africa has shown, it is important to adopt tighter emission standards and fuel quality at the early stages of industrial development and motorization. Even though Nigeria has framed notification to introduce 50 ppm sulphur fuel, its implementation is getting delayed. Without the fuel it will not be possible to adopt tighter emissions standards.

Nigeria also sets the example of taking additional measures to ban more polluting technologies like two-stroke engines. This has helped to avoid enormous pollution.

Spotlight on Ethiopia

Ethiopia is another example of a country promoting local assembly and manufacturing of vehicles but has not yet framed a deliberate policy to curtail vehicle import.

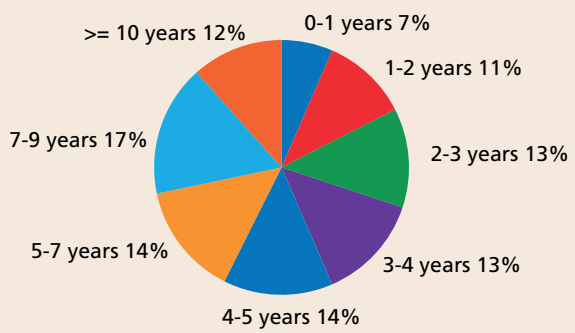
As much as 85 per cent of imported vehicles that come largely via the Gulf States, through the Port of Djibouti, are old and used vehicles. Motorization is riding high on these vehicles. Ethiopia has little less than one million vehicles. Nearly 70 per cent of the vehicle fleet is six to over 15 years old. According to the data shared by the Addis Ababa Transport Authority with the Centre for Science and Environment, vehicle numbers have increased by six times since 2002 from a small base level. About 35.6 per cent of cars are more than 10 years old (see *Graph: Age profile of vehicles in Ethiopia*).

According to Nigussie Kebede, Director for Urban and Rural Transport Service Support, Federal Transport Authority Ethiopia, the vehicle fleet consists of very old vehicles and without adequate maintenance. On an average, vehicles being imported in the country are 20 or more years old. The age of most of the national fleet is believed to be 30 or more years. However, most of the public-transport buses are new; even trucks are of a newer vintage.

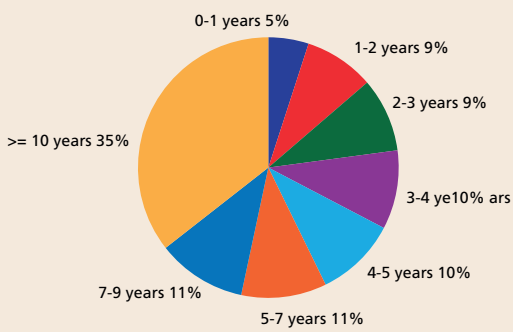
Age restriction: Currently, there is no age limit for vehicles being imported in Ethiopia. The Ethiopian Revenues and Customs Authority (ERCA) is currently working on new version of tariff tax proposal has proposed limit for imported vehicles. The Ministry

Age profile of vehicles in Ethiopia

Age-wise registered vehicle fleet



Age-wise registered car fleet



Source: CSE analysis of 2014–15 vehicle registration data from Addis Ababa Transport Authority

Another good practice has been to price diesel fuel higher than gasoline. This has discouraged dieselization. This is an important strategy as the massive diesel car phase out in Europe is likely to lead to massive influx in this part of the world.

Sources:

1. *Anon. 2015, The African & Nigerian Automotive Industry-Market Report 2015, XCom Africa*
2. *WHO 2016, Global Health Data Repository, http://apps.who.int/gho/data/node.main.A995 as accessed on 20 June 2016*
3. *WHO 2016, Global Health Data Repository, http://apps.who.int/gho/data/node.main.A995 as accessed on 20 June 2016*
4. *PricewaterhouseCoopers Limited, 2016 Africa's next automotive hub, 2016, Nigeria Automotive Industry, https://www.pwc.com/ng/en/assets/pdf/africas-next-automotive-hub.pdf*
5. *PricewaterhouseCoopers Limited, 2016 Africa's next automotive hub, 2016, Nigeria Automotive Industry, https://www.pwc.com/ng/en/assets/pdf/africas-next-automotive-hub.pdf*
6. *National Automotive Design and development Council, 2017, Information documents on the Nigerian Automotive Industry Development Plan, Federal Ministry of Trade and Investment*
7. *Automotive Design and development Council, 2017, Information documents on the Nigerian Automotive Industry Development Plan, Federal Ministry of Trade and Investment.*
8. *National Automotive Design and development Council, 2017, Information documents on the Nigerian Automotive Industry Development Plan, Federal Ministry of Trade and Investment.*

of Transport has submitted a proposal to limit the vehicle age to a maximum of eight years to reduce air pollution and public health impacts. The proposal also aims to ban import of any vehicle and engine whose manufacturers have stopped production.

Fiscal strategy: Even though Ethiopia is among the few countries that have started to assemble new vehicles, imported vehicles outnumber new assembled vehicles. Current tax measures are not designed to provide incentives for newly assembled vehicles over imported vehicles.

According to experts, the excise tax on import of vehicle parts and additional excise tax after assembly makes locally assembled vehicles more expensive. For example, a brand new 2014 Lifan 520 model is sold for 288,000 Br (Ethiopian Birr) while a 1989 to 1990 Toyota Corolla locally dubbed Weyane DX model is sold for 2,90,000–3,20,000 Br. Similarly, a 2014 Lifan 620 model is sold for 4,18,000 Br while a Toyota Corolla Executive model is sold for almost the same price.

Endale Yimer, Senior Tariff Classification Expert, Ethiopian Revenues and Customs Authority (ERCA), confirms that currently Ethiopian tax policy encourages import of used cars because new cars have higher taxation than used ones. This tax strategy is very different from Nigeria's, which is also promoting its own vehicle manufacturing and for that is making import of vehicles more expensive.

The total tax systems have a cumulative effect. The cost of a vehicle till Ethiopia's border is cost plus insurance and freight (CIF). Therefore, the total payment made for import of new vehicles is the sum of five types of taxes: Customs amount (CIF multiplied by customs rate), excise tax (sum of CIF and customs multiplied by the excise rate), VAT amount (sum of CIF, customs and excise tax multiplied by VAT rate), sur tax (sum of CIF, customs amount, excise tax and VAT multiplied by sur tax rate) and withholding tax (CIF multiplied by withholding rate). But in the case of import of used cars, depreciation amount (in years) is deducted, which makes imported used cars cheaper. For example, in the case of a car that is less than or two year old, 10 per cent is deducted from the CIF; two years and less than three years and greater than three years, the depreciation amount is 20 per cent and 30 per cent.[1] This clearly shows that depreciation amount increases with vehicle age and hence preference for used cars by Ethiopian importers. The vehicle taxation parameters include vehicle type, manufacturing year, engine capacity and loading and seating capacity. There is however no tax for local vehicle manufactures. The government collects 40 per cent of the total tax revenue from used cars.[2]

According to Yimer, both new and old cars are charged 35 per cent custom duty, the only difference being the depreciation cost, which is higher (US $150) in the case of new cars and less (US $100) for old cars. This policy needs a relook.

The ERCA's new version of tariff tax proposal has proposed three-level tax rate structure—higher rate for used vehicles, medium for new vehicles and a lower rate for electric/solar and locally assembled vehicles. There are plans to impose mandatory certificate requirement for imported vehicles.[3]

Tax rate for imported vehicles in Ethiopia (in per cent)

No	Goods/ Items	Customs duty %	Excise tax %	Import Sur tax %	VAT %	With holding %
1.	Public transport					
	Less than 15 and greater or equal to 10 seats	35	-	-	15	3
	15 or more seats	10	-	-	15	3
	Passenger cars less than 10 seats					
2.	Cylinder capacity not exceeding 1300 cc	35	30	10	15	3
3.	Cylinder capacity 1300 cc but less than 1800 cc	35	60	10	15	3
4.	Cylinder capacity exceeding 1800 cc and not exceeding 3000 cc	35	100	10	15	3
5.	Electric/ battery vehicles	35	30	10	15	3
	Trucks					
6.	Cargo vehicles (based on weight) up to 1500 kg	35	-	-	15	3
7.	Cargo vehicles >1500 kg	10	-	-	15	3
8.	Heavy-duty, 5-20 tonne	10	-	-	15	3

Source: Ethiopian Revenues and Customs Authority

However, import tax measures have certain good elements. It prioritizes public transport over personal vehicles and therefore taxes cars higher than public transport and freight vehicles. The custom duty is same for all vehicles. Excise tax increases with increase in engine capacity and type of vehicle (see *Table: Tax rate for imported vehicles in Ethiopia*).

Emissions standards and fuel quality: Ethiopia is developing draft emission standards for vehicles. This will address the issues of fuel quality, type and age of vehicles. The sulphur content in diesel is lowered from time to time but is still very high. The maximum allowable sulphur in diesel fuel is 500 ppm and in gasoline 1,000 ppm. Quicker introduction of 50 ppm sulphur fuels will enable harmonization (see *Table: Progress towards implementing cleaner vehicular fuels*). It is possible to design a fiscal strategy to meet the cost of import of improved fuel quality. Local assembly plants should be encouraged to manufacture vehicles complying with improved emissions standards.

Vehicle inspection: Efforts are being made in Ethiopia to organize vehicle-inspection centres to address the problem of in-use emissions. The Road Transport Authority under the Ministry of Infrastructure in Ethiopia is the nodal agency responsible for

chassis. Import Tax Rate on used vehicles imported in Bangladesh from Japan consists of import tax (0–40 per cent) and VAT (15 per cent). An infrastructure development surcharge of 2.5 per cent is levied on imports. Also, excise taxes are levied on vehicles. Duty-free importation of one used vehicle is allowed only for diplomats and privileged persons. All other Bangladesh nationals and foreigners have to pay duties to import a used vehicle.[55]

Nationals returning to Bangladesh after ten years or more are regarded as 'returning nationals' and are eligible for importing one vehicle duty-free if the vehicle has been with the owner for at least two years. Consideration is given to the special circumstances of returning individuals and their likely contribution towards nation building. Returning nationals are also exempt from Bangladesh sales tax charges on a vehicle that has been owned by them for at least a year prior to its import and is used for personal purposes (see *Box: Detailed vehicle*

Progress towards implementing cleaner vehicular fuels

	Average sulphur content of imported gasoline in ppm	Minimum ppm	Maximum ppm
2004	610	40	900
2005	150	40	900
2006	560	200	900
2007	750	700	900
2008	391	40	800
2009	380	40	900
2010	120	40	900
2011	244	40	600
2012	550	400	1000
2013	395.6	37	1000
2014	204.75	32	1000
2015	217.5	40	900

	Average sulphur content of imported diesel in ppm	Minimum ppm	Maximum ppm
2004	9,130	7,000	9,900
2005	6,100	3,100	9,700
2006	4,990	1,400	9,500
2007	4,480	2,800	4,800
2008	4,410	4,000	9,300
2009	4,770	3,800	4,900
2010	4,580	3,400	5,000
2011	4,690	4,000	5,000
2012	4,750	4,700	4,800
2013	1,855	243	4,800
2014	805	269	1,800
2015	925	245	1,850

Source: Manaye Balcha 2015, Transport fuel quality specification, Paper presented at the Stakeholder Workshop on Air quality and transportation challenges in Ethiopia and agenda for Clean Air Action Plan, Ministry of Environment and Forest, The Federal Democratic Republic of Ethiopia and Centre for Science and Environment, Addis Ababa, 8 September.

vehicle inspection. According to the Authority, regulations for all vehicles are required to undergo annual technical inspection at a designated vehicle-inspection centre, where vehicle roadworthy tests are conducted along with exhaust emissions measurement against the standard set by the Authority.

Lesson from Ethiopia: Promotion of local manufacturing and assembly will require control on import of old vehicles. This will also require improved emissions standards and fuel quality to get commensurate benefits. Promoting local manufacturing without improved emissions standards and controls on used vehicle import will not provide environmental benefits. The good practice in Ethiopia is that their taxes are differentiated according to engine size; and cars are taxed higher than the public transport and freight. Ethiopia is also considering moving to electric mobility especially for two-wheelers quite early on. Two-wheeler numbers have begun to grow only now. This is an opportunity to link it with electric mobility. Ethiopia's hydropower makes such an initiative carbon neutral.

Sources:

1. Endale Yimer, 2018, General Overview of Import Vehicle Policy and Taxation Systems of Ethiopia, Paper presented at the Training Workshop on Clean Air Action Planning Strategies for Cities of Ethiopia, Nigeria and Kenya, Nimli, 5–9 February 2018.

2. Yehalem Tesera et al 2018, Roadmap for Clean Air, Paper presented at the Combating Dumping of Used Vehicles: Regional Consultation on Roadmap for Vehicle Import Policy in Africa and South Asia for Clean Air, Centre for Science and Environment, Zanzibar, 31 May 2018.

3. Ibid.

import regulations in Bangladesh). These conditions have made a significant impact.

Supportive action for on-road vehicles: Action on vehicle import is supported by a range of other measures. Bangladesh has taken action to remove old and polluting vehicles from its fleet in its capital Dhaka, with impressive results. It is estimated that a ban on highly polluting three-wheelers with two-stroke engines or baby taxis led to an estimated reduction of 40 per cent of particulate emissions from the transport sector.[56] It has since 2002 banned trucks older than 25 years and buses older than 20 years in domestic market.

Emissions standards and fuel quality: Benefits from the five-year cap on imported vehicles can be maximized if national emissions standards for vehicles and fuels become tighter. Otherwise, the emissions from the less than

Detailed vehicle import regulations in Bangladesh

Motor cars of any engine capacity, microbuses, minibuses and jeeps, old vehicles and tractors are importable under the following conditions:[1]

- No vehicle shall be over five years old in the case of shipment;
- Old vehicles shall be importable only from the country of its origin. Old vehicles shall not be importable from any third country except those which were used personally and are to be used personally. In the case of import from a third country, a certificate of registration and certificate of cancellation of registration (from the country of use) will need to be submitted to the customs authority;
- A certificate containing age, model number and chassis number of the old car will have to be submitted to the custom authority from the Japan Auto Appraisal Institute (JAAI) in the case of import of cars from Japan, and from the recognized Automobile Association in the case of import of old cars from other countries;
- To determine the date/age of an imported old car, the date/age is calculated from the first day of the next year of manufacture of chassis;
- In the case of imported cars from Japan, date of manufacture shall be determined after examining the chassis book published by the Japan Automobile Association; for imported vehicles from other countries date of manufacture will be determined by examining the chassis book published by the concerned government-approved Automobile Association. No old car or vehicle shall be importable from a country that does not publish chassis books;
- With respect to catalytic converters in petrol-driven cars and connection of diesel particulate filter in diesel-driven cars, action shall be taken as per S.R.O.29-law/2002 dated 16 February 2002 issued by the Ministry of Environment and Forest;
- No car shall be importable without seat belt;
- Windshield glass and window glasses on both sides of the driver's seat must be transparent so that inside of the car is visible.
- Three-wheeler vehicles of two-stroke engine (tempo, auto rickshaw etc.) are banned for import.

Source:
1. Import Policy Order 2015-2018, Ministry of Commerce, Government of the People's Republic of Bangladesh, http://mincom.portal.gov.bd/sites/default/files/files/mincom.portal.gov.bd/page/e177ee18_f389_4f9e_a40c_57435cfac5b2/Import%20Policy.pdf

five-year-old vehicles from the advanced markets will be grossly compromised. According to the current roadmap, Bangladesh will introduce 50 ppm sulphur fuels in 2023. Currently, the diesel fuel quality is 500 ppm and this is linked with Euro I standards[57] (see *Table 13: Vehicular emission standards in Bangladesh*).

However, Bangladesh has taken strident steps to expand its CNG and LPG programme. In fact, CNG is one of the most successful programmes, with over 70 per cent of the city's fleet running on clean fuel. Studies carried out in

Table 13: Vehicular-emission standards in Bangladesh

Vehicle type	Present	2018	2020
Light-duty diesel vehicles with GVW≤ 2,500 kg	EURO I	EURO II	EURO III
All cars and light-duty diesel vehicles with GVW: 2,500–3,500 kg	EURO I	EURO II	EURO III
Light-duty petrol and CNG vehicles with GVW≤ 2,500 kg	EURO II	EURO III	EURO IV
All cars and light-duty petrol and CNG vehicles with GVW: 2,500–3,500 kg	EURO II	EURO III	EURO IV
All commercial diesel vehicles > 3,500 kg	EURO I	EURO II	EURO III
All commercial CNG vehicles > 3,500 kg	EURO II	EURO III	EURO IV

Source: Noor E. Alam, 2018 Paper presented at the UNEP workshop, Challenges in implementing stricter vehicle emission standards in Bangladesh, Bangladesh, March 2018.

Dhaka have already shown that the CNG programme has helped prevent 4,260 premature deaths annually in the city. The health-cost saving is close to 1 per cent of the GDP; 5,000 vehicles have now been moved to LPG.[58]

Lesson from Bangladesh: Bangladesh has taken progressive steps to eliminate very old vehicles from its imported fleet. This is backed by age regulations of commercial vehicles in the domestic market. However, Bangladesh is not being able to get the full benefit of lowering the age of import to five years as it has not yet adopted tighter emissions standards for vehicles and fuels. The natural gas vehicle programme has given it a substantial advantage to improve emissions. But this will require strong quality control.

Bhutan

Even though Bhutan is a small landlocked hill country located in a pristine environment, its capital city Thimpu is facing air pollution problem due to the valley effect. As of April 2018 Bhutan has 94,956 vehicles—this number is rising rapidly. Between1997 and 2017, the vehicular fleet increased by 577 per cent. Personal cars and two-wheelers are 65 per cent and 11 per cent of the total fleet respectively—together they add up to 76 per cent. According to the Bhutan Transport 2040 Integrated Strategic Vision 2011 document, the vehicle fleet is projected to increase substantially by 2040. Vehicle category-wise projection conducted by Grütter Consulting in 2017 shows a sharp increasing trend in passenger cars followed by heavy-duty vehicles greater than 7.5 tonnes; the data shows that passenger cars are the second highest emitter of PM, NO_2 and SO_2, after heavy-duty vehicles.

Bhutan aims to reduce annual average levels of all air pollutants to below the WHO guidelines by 2025. Accordingly, emissions of SO_2, NOs, and PM from vehicles are proposed to be reduced by 65–95 per cent of 2015 emissions levels by 2030, and CO_2 emissions from the transport sector by 25 per cent by 2030. Bhutan is in the process of designing a low-carbon vehicle strategy and tap international climate finance to assist in its implementation.

Banned used-vehicle import: Bhutan has been the first country among the vehicle-importing countries in the region to take an early decision in 1999 to ban import of second-hand vehicles regardless of the origin in view of rising emissions and risk of Bhutan becoming a junkyard of used vehicles.[59] Before 1999, second-hand vehicles could be bought from India and other countries. From 1994, reconditioned vehicles mostly from Japan started coming into the country. In 1999, second-hand/reconditioned vehicle import regardless of the country of origin was banned. With regard to two-wheelers, only four-stroke two-wheelers are allowed; three-wheelers and tempos are not registered in the country. Bhutan also regulates the age of the on-road fleet. The age limit for commercial vehicles, including high-end buses, is 14 years and for other buses and taxis it is nine years.[60]

However, in 2013, the government made an exception to allow import of certain vehicles meant for public use and those that came as grant assistance such as second-hand ambulances, fire-fighting vehicles and garbage trucks that were less than 10 years old. Further, in 2014, partial modification was done and the government approved import of used electric Nissan Leaf vehicles with mileage less than 30,000 km that can be used as taxis.[61]

Certain exemptions have been made in the case of foreign diplomats and employees of international organizations, who may bring in their used vehicles

on their transfer to Bhutan, subject to re-export on repatriation. Under certain conditions, Bhutanese nationals temporarily stationed abroad would be permitted to bring in the used vehicles if they have worked in a third country for a period of at least two years. The vehicle must be procured and registered in the Bhutanese national's name in the country of residence at least one year prior to its import into Bhutan; the vehicle procured abroad is new, not second hand; and duty and sales tax applicable shall be payable.[62] Only new vehicles can be registered in the country; used vehicles registered in another country cannot be registered in Bhutan (see *Box: Import regulations and new proposals in Bhutan*).

According to the 2016 Bhutan Trade Statistics, Bhutan imports diesel fuel and new passenger cars, transport goods vehicles from India; and cars and commercial vehicles from Japan, Korea and Thailand. Bhutan imports dominant model vehicles from India (Maruti, Tata, Mahindra, Ford, Nissan etc.), Japan (Toyota, hybrids, power tillers, earth moving machines), South Korea (Hyundai, Kia, Sorento), China (pickups and buses), Vietnam (power tillers) and Thailand (pickups and vehicle parts). It has taken very important steps and has shown how import regulations can be used to stop import of used vehicles and also leverage it to promote electric mobility in the country.

The next steps for Bhutan are implementation of the National Transport Policy,

Import regulations and new proposals in Bhutan

Tax according to engine size: The available information on Bhutan's import regulations for vehicles show that Bhutan has elaborate duties and taxes according to the engine size of cars.[1]

- Engine capacity up to 1500 cc: 45 per cent customs duty, 45 per cent sales tax and 10 per cent green tax.
- Engine capacity 1500 –1799 cc: 50 per cent customs duty, 50 per cent sales tax and 15 per cent green tax.
- Engine capacity 1799 –2500 cc: 50 per cent customs duty, 50 per cent sales tax and 20 per cent green tax.
- Engine capacity 2500–3000 cc: 50 per cent customs duty, 50 per cent sales tax and 25 per cent green tax.
- Engine capacity above 3000 cc: 100 per cent customs duty, 50 per cent sales tax and 30 per cent green tax.
- Vehicles imported from India are exempt from customs duty.

Second hand vehicles that are allowed limited entry and are running in the country requires to pay an additional 5 per cent green tax on fuel that is embedded in the price of every litre of petrol and diesel to support the government's policy of clean and sustainable transportation system.

Electric and hybrid cars: For hybrid cars of up to 1500 cc, a sales tax of 20 per cent, another 20 per cent customs duty and 5 per cent green tax, totalling 45 per cent is levied. It increases by five per cent for every higher engine specification.[2] New proposal on differential taxes, tax exemptions on electric and hybrid vehicles. Measures such as high 'feebates' or fuel surcharge being explored to disincentivize private diesel vehicles.[3]

Vehicle inspection: All in-use vehicles are subjected to bi-annual emissions testing. These include smoke density tests in diesel vehicles and idling carbon monoxide and hydrocarbon in petrol vehicles. Auditing of emission testing centres is carried out regularly. Efforts are being made to link test data with vehicle registration data to identify and track vehicles that have not been tested yet. This will require proper vehicle registration at ports of entry.

Sources:

1. *Japanese Car Trade.com, 2017-18, Bhutan Import Regulation for Japan Used Cars, https://info.japanesecartrade.com/content-item/514-bhutan-import-regulation-for-japan-used-cars*
2. *Cars. BT, 2015, Vehicle Import Tax, http://cars.bt/newcars/vehicle-import-tax/*
3. *Karma Pemba, 2018, Sharing Bhutan's Experience on Regulations of Vehicle Import, Banning of Used Vehicles: Impact, Lessons and Next Steps, Paper presented at the Combating Dumping of Used Vehicles: Regional Consultation on Roadmap for Vehicle Import Policy in Africa and South Asia for Clean Air, Centre for Science and Environment, Zanzibar, 31 May 2018.*

promotion of eco-friendly vehicles (start with replacement of 300 taxis with EV taxis), implementation of low-carbon vehicle strategy, implementation of the revised Surface Transport Act, and tightening of standards.

Emission standards and fuel quality: Bhutan has just mooted the proposal to import only diesel and gasoline fuels with less than 50 ppm sulphur in line with the Indian fuel and vehicle standard in 2018 and subsequently fuel quality with less than 10 ppm sulphur in 2020 when India will also make the transition to Euro VI level. It will also implement new vehicle-emission standards for gasoline and diesel vehicles in the near future.[63]

Bhutan has already increased the sales tax and import tax by 50 per cent so that the cost of importing and owning a car becomes expensive for customers. The final revised national transport policy proposes phasing out of old vehicles. Bhutan will also frame appropriate regulations related to end-of-life of vehicles, which would include process of disposal of vehicles once they reach their end of life.[64]

Lesson from Bhutan: Very early on, Bhutan acknowledged its geographical constraint and the high risk from motorization in the landlocked valleys that are hugely vulnerable to pollution and congestion. Despite being a small country, it incorporated several progressive elements and aside from adopting stringent measures to control vehicle import—Bhutan banned import of used vehicles early in its growth—also took steps to align the emission-standards roadmap with the tighter emission standards in vehicle-producing countries in the region as well as evolve an incentive policy for electric vehicles. It adopted a holistic approach, with these strategies also linked with the integrated mobility strategies in which tax measures are being used to discourage personal vehicle ownership and particularly import of diesel cars. This combination of measures is an important learning curve in the region.

Nepal

Nepal is motorizing rapidly and the trend has picked up since 2012. It has a registered vehicle fleet of 2.78 million (as of 2016–17). Motorcycles constitute 79 per cent of the total vehicles. Though the country is dependent on imported vehicles, it has taken effective steps to reduce import of used vehicles (see *Box: Regulations on vehicle import in Nepal*).

Ban on used vehicle import: Nepal had initially banned import of five-year-old vehicles. Subsequently, used-vehicle import was banned under the Financial Act in 2012. Only new vehicles complying with Euro III emission standard are allowed to be imported.[65] All imported vehicles have to meet the Nepal Vehicle Mass Emission Standard. The government is now considering banning import of vehicles not meeting Euro IV emissions standard. The Nepal Automobile Dealers Association supports this move and predicts a 5 per cent increase in vehicle price.[66]

Nepalese citizens returning after completing their tenure in Nepalese diplomatic mission abroad and foreign diplomatic staff member working in Nepal are allowed to import personal used vehicles with official permission. According to information available from Nepal Customs, other Nepalese citizens are not allowed to import personal used vehicle in Nepal.

Fiscal strategy: Nepal imposes high import duty (288 per cent) on cars, making the import of cars expensive.[67] High import duty on vehicles is a major source

Regulations on vehicle import in Nepal

30 August 1999 (Nepal Gazette Part 49 Supplement 21 (A+1)
- Registration of new two-stroke engine vehicles banned
- Registration and transfer of title of diesel powered three-wheelers banned
- 99 per cent custom duty and 100 per cent Value Added Tax (VAT) waived for entrepreneurs importing gasoline powered 10–14 seater bus by displacing diesel three-wheelers

23 December 1999 Nepal Gazette Part 49 Pre-Supplement 38 (A+3)
- Introduction and enforcement of Nepal Vehicle Mass Emission Standard 1999 (Equivalent to Euro I) except for tractors, power tiller, dozer, loader, dumper, crane, roller and excavator

11 August 2000 Government Notification
- Restriction on import of used items including machineries and their parts, engine pumps and piston heads

23 October 2000
- In-use Vehicle Emission Standard (Green Sticker Standard)

10 November 2000 (Nepal Gazette Part 50 Supplement 41)
- Ban on operation of all types of vehicles in Nepal made prior to 1980 with effect from 16 November 2001
- Ban on operation of two-stroke engine based vehicle and petrol or diesel fuelled three-wheelers inside Kathmandu valley with effect from 16 November 2001
- Ban on operation of diesel three-wheelers all over Nepal

13 August 2012
- Nepal Vehicle Mass Emission Standard 2012 (Equivalent to Euro III)

14 March 12016
- Strategic work plan for development of road, rail and transport for prosperous Nepal (2016–21), which included all public vehicles to be scrapped within two years, that is 14 March 2018 and 20 per cent of all vehicles plying in the country to be converted to environment-friendly vehicles

22 February 2018
- Revision of In-use Vehicle Emission Standard with effect from August 2018

Source: Ram Chandra Poudel 2018, Nepalese Experience on Management of Motor Vehicles, Paper presented at the Combating Dumping of Used Vehicles: Regional Consultation on Roadmap for Vehicle Import Policy in Africa and South Asia for Clean Air, Centre for Science and Environment, Zanzibar, 31 May 2018.

of revenue for the government. Nepal is also making vehicle import more expensive.

Emission standards and fuel quality: Nepal has taken the progressive step forward by linking Euro III emission standards with vehicle import and is now considering moving to Euro IV emissions standards. Its fuel quality supply is linked to that in India. Since April 2017, the Nepal Oil Corporation (NOC) has been supplying Euro IV fuel and from 2020, NOC may supply Euro VI fuel.

Promoting electric vehicles: The current tax system gives concession to electric vehicles. The government has exempted VAT on import of electric three-wheelers, battery, electric motor and chassis. It has exempted components and parts required for converting to electric three-wheeler, catalytic converters, magnetizers and machines and equipment for battery recycling plant from full custom duty. It also allows partial custom duty exemption to hybrid vehicles (25 per cent), large buses with over 40 seats (95 per cent) and components for use in manufacturing electric rickshaws.

Vehicle inspection and certification for vehicle import: The Motor Vehicle and Transport Management Act 1993 mandates provision of type approval and conformity of production prior to vehicle import. Road-worthiness tests are carried out for assembled vehicles. At present there is no pre-shipment inspection done for imported new vehicles. Import is permitted upon submission of type approval and conformity of production certificates issued by a competent authority in the manufacturing country. Rule 39 (2) of the MVTMR mandates biannual road tests for public vehicles. This includes examination of the vehicle body, windows, seats, windscreen, headlights, sidelights, back lights and other lights, starting, pick-up and general tuning of engine, steering, brakes, gears, tyres, wheels, springs, tie-rod, noise and emissions.

System for verification of vehicles: Under the provisions of Finance Act-temporal for vehicle import, only an authorized dealer can import vehicles from the country of manufacture or from an authorized dealer in another country. If a vehicle is not being imported directly from the manufacturer, the importer should furnish a tripartite agreement between the manufacturer, exporting dealer and importer.

Strategic programmes for promoting environment friendly vehicles: Nepal is planning to promote its national industry. Government or government-owned entities will buy vehicles giving priority to national products, making at least 20 per cent of all vehicles environment friendly by 2020. Income tax, custom, VAT, excise duty and rebates will be designed accordingly and provide for exemptions under the Finance Act. It is also looking at tests, registration and operation, priority sector for bank credit, and cooperation between public, private and cooperatives for building green transport modes like ropeways, charging stations for electric vehicles and parking lots with solar-powered charging facilities for electric vehicles, and promotion of battery recycling industry. Strategies also include pollution tax on battery, separate lanes for cycles, conversion of old vehicles into electric vehicles and public transportation.[68]

Lesson from Nepal: Nepal has taken important parallel steps of banning import of used vehicles while linking improved emissions standards of Euro III with vehicle imports. It is now moving towards Euro IV emissions standards. Simultaneously, it is encouraging import of electric and hybrid vehicles and local assembly of electric vehicles. There are official plans to develop physical infrastructure and human resource for effective implementation and monitoring of existing standards and policies. There are plans to establish Mass Emission Lab to conduct tests on random sample of imported vehicles, and setting up of central database connecting emission testing centres. This is to be supported by seven vehicle fitness test centres across the country. More incentives and promotional steps are to be taken for import and production of electric vehicles and simplification of the testing and registration of such vehicles. There is official recognition of the importance of awareness raising programmes for transport entrepreneurs and the general public.

Pakistan

Pakistan's import policy order (2012–15)[69] is a comprehensive policy for import of used vehicles, but its implementation has become complicated due to several import schemes. Import of all types of vehicles are regulated by the Used Vehicles Import Policy (see *Box: Detailed regulations for vehicle import to Pakistan*).

Detailed regulations for vehicle import to Pakistan

The following rules are implemented under the Used Vehicles Import Policy in Pakistan:

- No used vehicles are allowed to be imported into Pakistan except through the following schemes:
  - Personal baggage scheme
  - Transfer of residence scheme and
  - Gift scheme
- Age limit of three years to be continued in the case of cars
- Age limit of five years to be continued in the case of buses, vans, trucks, pick-ups and SUVs, including 4 x 4 vehicles
- Special Purpose Vehicles of the following HS codes older than five years shall be imported into Pakistan by the end-user as specified in the Import Policy Order:
  - Prime movers of 280 HP and above (HS Code 8701.2040)
  - Concrete mixer lorries (HS Code 8705.4000)
  - Dumpers designed for off highway use (HS Code 8704.1090) and
  - Other (HS Code 8705.9000) including water sprinklers shall be maintained
- In addition to the aforementioned, the following are the conditions associated with the policy:
  - The Federal Board of Revenue issues a yearly schedule of import duties of all types of vehicles in US dollar terms on 30 June of each year
  - No relaxation regarding age and applicable duty is granted under any circumstance
  - Ministry of Commerce has defined standard operating procedures (SOPs) under Import Policy Order for used cars to prevent misuse of the facility
  - The policy does not preclude import of brand new CBU (Completely Build Units) by individuals other than expatriate Pakistanis on payment of prescribed import duty

Source: Ministries of Industry and Production, Government of Pakistan, 2016, Automotive Development Policy (ADP) 2016- 21, http://boi.gov.pk/boi/userfiles1/file/AutoPolicy/APCompressed.pdf, as accessed on 24 April 2018.

Age restriction: Pakistan has banned import of old used vehicles. The age limit for cars is three years and for buses, vans, trucks, pickups and SUVs (sport utility vehicles), including 4 x 4s, is five years. Import of used cars is allowed under only in the following schemes—bringing the vehicle into the country on transfer of residence from another country, and sending a vehicle as a gift to a family member residing in Pakistan (once in two years).

In 2011–12, import of used cars had reached an all-time high of 57,000 cars due to the relaxation in age limit from three to five years. In the subsequent year, however, the age limit was reduced to three years and imports dropped to 45,000 cars in 2012–13 and 29,000 in 2013–14.[70]

Lesson from Pakistan: Pakistan has demonstrated very effective application of age restriction on imported vehicles. It will benefit further from this strategy if improved emission standards of at least Euro IV level and commensurate fuel quality are adopted simultaneously. The advantage that Pakistan has over most other countries in South Asia is its extensive natural-gas-vehicle programme.

Sri Lanka

Sri Lanka is heavily dependent on vehicle import as it does not have a local vehicle manufacturing industry nor a petroleum resource base. There is one small refinery that caters to about 35 per cent of the local demand. Sri Lanka, an island country, is motorizing rapidly. As of 2017, it has an active vehicle fleet of 5 million. Personal vehicles alone have increased by 83 per cent since 2000.[71] Two-wheelers are 52 per cent of the fleet. Of 150 billion passenger-km per year every year, 94 per cent is by road, which contributes about 40 per cent of the greenhouse gas emissions[72] and a significant amount of local air pollutants. According to Thusitha Sugathapala of the University of Moratuwa, Sri Lanka,

who works with the government on key fuel-efficiency and pollution-related policies in the transport sector, the transport sector is heavily influenced by fiscal policies related to the import of vehicles as well as fuels.

Sri Lanka has designed its import policy to combat growing dieselization and import of very old second-hand vehicles. Diesel vehicles are 45 per cent of the total fleet of four-wheelers. Studies in Sri Lanka have attributed Rs 22–17 billion to health damage cost owing auto diesel emissions in Colombo. Diesel vehicles were responsible for 96–89 per cent of sulphur dioxide and particulate matter from the transportation sector. There were also concerns around growing import dependence on oil.

Sri Lanka has therefore adopted a series of tax and other regulatory measures to change the market towards cleaner vehicles. In the first phase it banned import of two-stroke powered two-wheelers and launched mandatory annual vehicle-emission testing programme in 2008. It also initiated conversion of three-wheelers to LPG/electric. It has started construction of a refinery that can produce Euro IV compatible diesel fuels.

Age cap in Sri Lanka: Sri Lanka has fixed the age for vehicle import—three years for passenger cars and three- and two-wheelers, and five years for vans, buses and lorries. Previously, second-hand vehicles imported for personal use had an age restriction of four years while those for business use had five years. Sri Lanka has also tried an age cap of two years for second-hand vehicles from Japan. All vehicles have to undergo roadworthiness inspection testing, and vehicles that fail must either be repaired or be taken off the road. In other words, very old used vehicles are not allowed in Sri Lanka.

While this age cap is expected to bring improved vehicle technology of Euro III or Euro IV and even better technology from Japan, the lack of commensurate fuel-quality locally constraints the potential of emissions benefits (see *Table 14: Permitted age limits for import of used vehicles in Sri Lanka*).[73]

Fiscal measures in Sri Lanka: The most strategic measure is the taxation policy, which is differentiated according to age, fuels, engine size and vehicle type. The 2018 Budget proposal (effective from November 2017) has adopted the policy vision that by 2040 all vehicles will be powered by renewable energy. By 2025, all government vehicles will be either electric vehicles or hybrid. Carbon tax will be imposed on all ICE/hybrid vehicles while electric vehicles will be exempt. Taxes will be imposed proportional to engine capacity; the larger the capacity range, the higher the rate.

Tax rates will increase for three age ranges: < 5 years; 5–10 yrs; > 10 years. Similarly, import tax for electric vehicles will be reduced; electric three-wheelers will be promoted; 50 e-buses will be procured for government-owned bus operators, and solar electric charging stations are proposed.[74]

Accordingly, several changes have been brought about in the tax regime. Prior to 2015, nine taxes and levies were in effect. Post 2015, further rationalization has been followed to simplify the tax system to three tax items (applied on FOB).

The new tax system for light-duty vehicles is proportional to engine capacity (on a linear scale)—higher rates for higher capacity ranges (see *Table 15: Change in taxes based on fuel and engine capacity since 2015 in Sri Lanka*).

Sri Lanka has adopted higher tax for diesel cars as compared to petrol cars

Table 14: Permitted age limits for import of used vehicles in Sri Lanka

Description of vehicle	Specifications	Age limit (in years)
Road tractors (prime movers)		5
Agricultural tractors		10
Buses (10–12 passengers, including driver)		3 ½
Buses (13–24 passengers, including driver)		5
Buses (25 and above, including driver)		10
Motor cars		3
Trishaws		2
Sports utility vehicles (jeeps)		3
All-terrain vehicles (beach bikes)		3
Dual-purpose vehicles (vans)		4
Single cabs		4
Double cabs		4
Ambulances		3
Hearses		3
Motor homes		3
Lorries/trucks	GVW less than 5MT	4
Lorries/trucks	GVW above 5MT	10
Refrigerated trucks	GVW less than 5MT	4
Refrigerated trucks	GVW over 5MT	10
Milk bowsers	GVW less than 5MT	5
Milk bowsers	GVW over 5MT	10
Garbage trucks	GVW less than 5MT	5
Garbage trucks	GVW over 5MT	10
Crane lorries		10
Mobile drilling derricks		7
Fire-fighting vehicles		7
Concrete mixer lorries		10
Mobile workshops		7
Gully bowsers		7
Concrete pump trucks		10
Motor bikes		3

Source: Sri Lanka Customs, 2017, Moto Vehicle Unit, http://www.customs.gov.lk/declaration/mvu

Table 15: Change in taxes based on fuel and engine capacity since 2015 in Sri Lanka

Engine capacity (CC)	Total tax (% of FOB): 2015–17 (before 2015)		
	Gasoline	Diesel	Hybrid
< 1,000	195 (180)	245 (245)	97 (77)
1,000–2,000	205 (191.6)	270 (262.6)	117 (104.9)
2,000–2,500	265 (247.5)	297.5 (287.5)	178.5 (143.5)
> 2,500	295 (267.5)	337.5 (347.5)	228.5 (188.5)

Source: Thusitha Sugathapala, 2018, Sri Lanka (Developing Fuel Economy Policies in Sri Lanka – Status and Challenges, Paper presented at Asia Pacific Clean Air Partnership Joint Forum and Clean Air Week, Bangkok, 20 May 2018.

Table 16: Differentiated taxes on hybrid and non-hybrid cars in Sri Lanka

Engine capacity	Hybrid	Non-hybrid
< 1000 cc	70% or Rs 1250 (US $8.5)/cm^3	150% or Rs 1750 (US $12)/cm^3
1,000–1,500 cc	90% or Rs 2000 (US $14)/cm^3	160% or Rs 2750 (US $18)/cm^3
1,500–1,600 cc	90% or Rs 3500 (US $24)/cm^3	160% or Rs 4000 (US $27)/cm^3
1,600–1,800 cc	90% or Rs 4000 (US $27)/cm^3	160% or Rs 4500 (US $30)/cm^3
1,800–2,000 cc	125% or Rs 4500 (US $30)/cm^3	160% or Rs 5500 (US $37)/cm^3
2,000–3,000 cc	150% or Rs 5000 (US $34)/cm^3	220% or Rs 6000 (US $40)/cm^3
Other	200% or Rs 5500 (US $37)/cm^3	250% or Rs 6000 (US $40)/cm^3

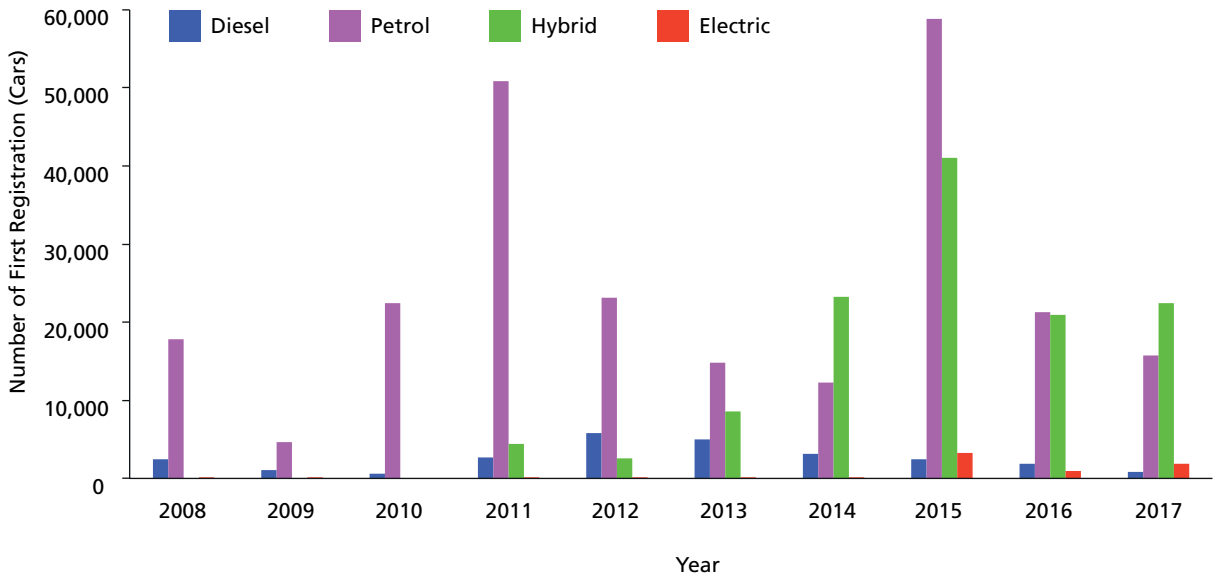
Source: Sugath Yalegama, 2017, An overview of policies on car importation and their effects – Case of Sri Lanka, Ministry of National Policies and Economic Affairs, Sri Lanka, https://www.unece.org/fileadmin/DAM/trans/doc/2017/itc/UNEP_15_An_overview_of_policies_on_car_importation_Sri_Lanka.pdf, Paper presented at the conference on Ensuring Better Air Quality and Reduced Climate Emissions through Cleaner Used Vehicles, Geneva.

and hybrid cars. Overall hybrid-petrol, petrol and diesel vehicles attract 58 per cent, 253 per cent and 345 per cent, respectively, in excise tax. Fully electric vehicles are levied at 25 per cent. Revised excise taxes are to focus on cc and kwh car ratings by 2018. While maintaining an effective gap between diesel and petrol vehicle taxes, tax on petrol vehicles has been revised upwards. Taxes are smallest on hybrids but it was still raised (see *Table 16: Differentiated taxes on hybrid and non-hybrid cars in Sri Lanka*).[75]

The tax regime has dramatically altered the market and reduced the share of diesel cars drastically while increasing the share of electric and hybrid cars (see *Graph 28: Impact of fiscal policies on car market: Emergence of hybrid and electric vehicles*).

Tax measure for electric vehicles: Electric vehicles are exempt from taxation. Three-wheelers attract 120 per cent, and electric vehicles 20 per cent (for vehicles < 3 years old) and 30 per cent (for vehicles > 3 years old). E3 vehicles attract 12.5 per cent (for vehicles < 3 years old) and 20 per cent (for vehicles > 3 years old). The tax on three wheelers has been increased to promote electric three wheelers. For two-wheelers, tax will be proportional to the engine capacity when the age < 3 years old. The rate depends on engine-capacity range, in increasing steps. The amount is fixed per vehicle when the age > 3 years. Tax on electric vehicles is to be lowered. Fully electric vehicles are levied at 25 per cent. Revised excise taxes are to focus on cc and kwh car ratings by 2018 (see

Graph 28: Impact of fiscal policies on car market: Emergence of hybrid and electric vehicles



Source: Thusitha Sugathapala, 2018, Sri Lanka (Developing Fuel Economy Policies in Sri Lanka—Status and Challenges, Paper presented at the Asia Pacific Clean Air Partnership Joint Forum and Clean Air Week, Solutions Landscape for Clean Air —United Nations Conference Center, Bangkok, 20 May 2018.

Table 17: Differentiated taxes on electric vehicles in Sri Lanka

< 50 kW	30% of Rs 15,000 (US $100)/kWh
50–100 kW	40% of Rs 25,000 (US $170)/kWh
100–200 kW	50% of Rs 40,000 (US $270)/kWh
> 200 kW	50% of Rs 55,000 (US $370)/kWh

Source: Sugath Yalegama, An overview of policies on car importation and their effects – Case of Sri Lanka, Ministry of National Policies and Economic Affairs, Sri Lanka, https://www.unece.org/fileadmin/DAM/trans/doc/2017/itc/UNEP_15_An_overview_of_policies_on_car_importation_Sri_Lanka.pdf

Table 17: Differentiated taxes on electric vehicles in Sri Lanka).

Lessons from Sri Lanka: There are several important lessons. Sri Lanka's vehicle-import policy is backed by a comprehensive policy and roadmap to promote clean fuel, technology and renewable energy. The import taxes have been effectively designed to discourage polluting vehicles and fuels like diesel and promote petrol and hybrids. This has succeeded in changing the market around. There are evidences to prove the impact that shows that the share of diesel cars has dropped while share of petrol and hybrid cars have increased.

Sri Lanka has taken an early lead to promote electric mobility for both personal as well as public transport, which is a win-win. It has seen dramatic shifts in the market because of the tax measures. However, Sri Lanka is still facing a serious barrier in terms of improving its fuel quality even though it has made attempts to import 10 ppm sulphur fuels in small quantities to take advantage of lower international prices of crude oil.

Myanmar

Table 18: Vehicle taxation for imported vehicles in Myanmar

Engine displacement	Custom duty (in per cent)	Special goods tax (in per cent)	Commercial tax (in per cent)
1,500 cc	30	-	5
1,501–1,800 cc	30	20	5
1,801–2,000 cc	30	20	5
2,001–4,000 cc	40	30	5
> 4,000 cc	40	50	5

Source: Dr Soe Tun, Automobile Industry in Myanmar, Myanmar Automobile manufacturer & Distributor Association (MAMDA), 2017.

Vehicle fleet in Myanmar is dominated by imported used vehicles. Myanmar has about 550,000 imported passenger cars and 350,000 trucks and buses. About 90 per cent of these vehicles are from Japan.[76] Car import has picked up since 2011.[77] As much as 98 per cent of cars are used cars.

Age restriction: The import rules have been recently revised to allow passenger cars manufactured only in 2016 or later to be brought into the country and trucks and buses manufactured only in 2014 or later to be brought in. The new guidelines have also allowed import of engines manufactured in 2009 or later. Fire trucks and ambulances manufactured in 2007 or later can be imported as long as they are left-hand drive. For heavy equipment such as excavators, bulldozers, wheel loaders and other big machines, only those that are 15 years old or less will be allowed to be brought into the country.[78]

Fiscal measures: The tax structure for vehicles in Myanmar is linked to the engine size—bigger engines attract higher taxes (see *Table 18: Vehicle taxation for imported vehicles in Myanmar*). In addition, the registration tax is also stratified according to the engine displacement. The lowest slab is 30 per cent for engine size less than 1,350 cc; 50 per cent up to 2,000 cc; 80 per cent for engine size up to 5,000 cc and 100 per cent for engine size above 5,000 cc. Electric vehicles get preference and draw only 1 per cent taxation.

This quick review of country-wise experience shows that most common strategies that have nearly uniformly been adopted by most countries include age restriction and taxation linked to engine size. But some countries have also moved forward to adopt additional stringent measures, including banning of used vehicle import, linking imports with improved emissions standards and promotion of electric vehicles. This emerging learning curve generates confidence that part of Africa and South Asia are already on their way to finding effective solutions.

SECTION 5: Setting the terms for used-vehicle export

Export of used vehicles is a significant part of the international trade of several advanced countries, including the US, EU, Canada and Japan. In 2014, for instance, used vehicles made up 14 per cent of US vehicle export. It is often argued that used-vehicle trade may have created a stronger incentive for not implementing several end-of-life regulations for older vehicles in advanced countries. It is more lucrative and cost effective to export used vehicles than scrap them.

The literature shows that in the Netherlands there is often a preference for export than end-of-life (ELV) of vehicles. The ratio of [export]/[ELV] increased from 0.3 in 2000 to 1 in 2007, up to 1.4 in 2012 and stabilized around 1.2 in 2013–14. Especially during 2000–08, there was a shift from ELV to export.[1] Instead of more old vehicles being scrapped, they were exported. This was also encouraged by the opening up of east European markets.[2] Used-car exports from Germany is two-thirds of all used-car exports within the EU. It is said that exports had declined significantly in 2009 when the German scrappage scheme was implemented.[3] Similarly, in the US, the proximity of the Mexican market makes it relatively easy and cheap to sell second-hand vehicles instead of scrapping them.[4]

It is, however, important to make a distinction between old, polluting vehicles and used vehicles. Advanced markets have high replacement rates and therefore for a substantial part of useful economic life of vehicles they are eligible for trading within the domestic market as well as for export. But vehicles that are old, damaged and polluting qualify for scrapping.

There are several issues to be addressed. How can exporting countries take the responsibility of disposing of old and polluting vehicles within the domestic market and restrict them from entering the international market? What criteria need to be applied to screen vehicles for export? There is need for clear international mechanism and harmonized protocol to uniformly report emissions, fuel economy and safety status of vehicles, accident and recall records of the vehicles, and a system to make different standards comparable for importing countries to take decisions.

Exporting countries themselves have adopted explicit regulations related to emission standards and labelling of vehicles, scrappage, end-of-life regulations and extended manufacturing responsibility. These regulations have strong bearing on the quantum and nature of vehicle exports, depending on how stringently they are implemented.

End-of-life regulations and used-vehicle export

More used vehicles are likely to get pushed out from advanced markets in the future as the environmental regulations around old and polluting vehicles become tougher. Several countries are introducing regulations to scrap old vehicles, debar or disincentivize entry of old and polluting vehicles into city centres by coding them yellow, banning older diesel vehicles in the city or disincentivizing them with higher taxes. A strong vehicle inspection programme has been implemented to promote good maintenance and rejuvenate the heavy-duty fleet by re-powering older vehicles with new engines or retrofitting older vehicles with emission-control systems. Several European countries have enacted end-of-life regulations.

Globally, legislative framework for recycling of end-of-life vehicles (ELVs) has emerged mainly for light-duty vehicles. ELVs are deregistered cars that will undergo treatment/recycling through appropriate processes within the country of origin. Currently, legislative ELV recycling systems are established in the EU, Japan, Korea, and China. In the US, ELV recycling is managed under existing laws on environmental protection.[5] The European Union, Japan and Korea have developed ELV recycling systems based on the extended producer responsibility principle, designed to recover used car parts, scrap metal, batteries, etc.[6]

A 2014 study has estimated generation of ELVs at 40 million per year globally, which is 4 per cent of total automobile ownership. In EU member states, Japan and Korea, reporting on the number of ELVs is mandatory under their legislative ELV recycling systems. But in other countries, the number of ELVs is usually reported by the recycling industry that processes and recycles the ELVs. Available data shows that deregistered automobiles can be more than ELVs because deregistered automobiles include used cars for export, unregistered cars used within private sites, or cars illegally dumped as waste.[7]

The number of vehicles that are deregistered annually in different countries is significant (see *Table 19: Global and country/state estimates of automobile ownership and ELVs*). In the EU it was estimated that in 2010 and 2020 14 million and 16.6 million cars were to be deregistered respectively.[8] In China, with rapid motorization, the ELV generation is expected to be 99.5 million in 2020.[9] In China, export of used vehicles is not legal.

Vehicle retirement

Vehicle retirement programmes are varied in nature and structure (see *Table 20: Summary characteristics of key vehicle retirement programmes in different countries*). Vehicle replacement programme aim at eliminating targeted vehicles from the fleet. Mandatory programmes enforce the retirement of the vehicle even if some useful life remains. Retirement in these programmes is based on age and mileage of vehicles. Mandatory retirement is more common in developing countries, where age caps are enforced to get rid of the older fleet. Delhi, in India, for instance, has imposed mandatory age caps on commercial vehicles as well as personal vehicles within its local market.

Often, vehicle retirement programmes are adopted as economic stimulus for the industry to ramp up sales of new vehicles as in the US and Europe following the 2008 economic recession. The 2009 Car Allowance Rebate System or the Cash for Clunkers programme in the US is an example. Mexico implemented a vehicle renewal programme in 2009. In 2009 the Cash for Clunkers programme that provides incentives for scrapping old vehicles resulted in over three times the normal amount of cars being scrapped—more than dismantling companies could handle over the course of that year.

There is no clear definition for classifying high-emitting vehicles; it varies across regions and depends on fleet characteristics, age and mileage, and original emission standards. Stringency will depend on the target set by the governments to control emissions and fuel guzzling. Vehicle-retirement programmes have been more widely implemented for light-duty vehicles; there are very few for heavy-duty vehicles. These measures together generate a large pool of old and used vehicles not wanted in the domestic market of high-income countries and are crowding in the international market and low-income countries. These schemes need to be designed in a targeted manner to ensure that they remove all older vehicles and replace them with more efficient

Table 19: Global and country/state estimates of automobile ownership and ELVs of over 10,000,000 units and positive calculated ELV in 2010

Country/state	Automobile ownership units[a]	De-registered automobiles (units/year) [b]	Number of ELVs (units/year) [c]
European Union[d]	271,319,000	14,077,000	7,823,211
(Germany)	(45,261,188)	(2,570,137)	(500,193)
(Italy)	(41,649,877)	(1,835,293)	(1,610,137)
(France)	(37,744,000)	(2,002,669)	(1,583,283)
(England)	(35,478,652)	(1,810,571)	(1,157,438)
(Spain)	(27,750,000)	(996,718)	(839,637)
Russian Federation	41,224,913	300,000	Not available
US	239,811,984	20,419,898	12,000,000
Canada	21,053,994	1,321,658	1,200,000
Brazil	32,100,000	1,058,064	1,000,000
Japan	75,361,876	4,080,000	2,960,000
China	78,020,000	6,000,000	3,506,000
Korea	17,941,356	849,280	684,000
Australia	15,352,487	600,311	500,000
Subtotal	792,185,610	57,921,599	29,673,211
Global total	1,016,763,420	15,805,275	40,176,051[e]

Note:

a. Data from Japan Automobile Manufacturer Association Inc. 2012 Values in () not included in total.

b. Indicates (number of automobiles without owner in the previous year + number of new automobiles in the market this year)—number of automobiles without owners this year. Global total is a reference value since the estimated number of deregistered automobiles (increase in the number automobiles with owners of the said year surpassed the number of automobiles for sale in the same year) in some countries was negative. The number of automobiles in Japan where the estimated umbers of deregistered buses and trucks was negative was from actual values in 2011. EU number is estimate value of EU 25.

c. The number of ELVs is summarized from different sources.

d. EU + Liechtenstein, Norway

e. The subtotal of ELVs was multiplied with the ratio between the global total number of owned automobiles and subtotal of the number owned automobiles in each country, excluding Russia.

Source: Shin-ichi Sakai et al. 2014, An international comparative study of end-of-life vehicle (ELV) recycling systems, Journal of Material Cycles an Waste Management*, February 2014.*

and lower-emitting vehicles to reduce emissions of CO_2 and local pollutants. Retiring vehicles that travel little provide minimal benefits.

Environmental benefits of these programmes are expected to be substantial. As new vehicles begin to meet substantially tighter emissions standards the older fleet becomes disproportionately responsible for much high emissions. According to the nonprofit International Council on Clean Transportation (ICCT)'s review of vehicle replacement programme,[10] for example, as the Chinese Ministry of Environment Protection estimated in Beijing in 2011, ten-year-old or older vehicles (Euro 0 or Euro 1 equivalent) constituted just 15 per cent of the total vehicle fleet, but these caused 61 per cent of the NOx and 76 per cent of particulate matter emissions; around 50 per cent of the particulate matter and black carbon emissions came from high-emitting vehicles. ICCT's estimate for India shows that pre-2003 vehicles are less than 23 per cent of the fleet but account for nearly half of the vehicular particulate matter and a third of NOx emissions in 2011.

Table 20: Summary characteristics of key vehicle-retirement programmes in different countries

Programme	Vehicles targeted	Approximate average subsidy offered	Complementary policy
US: California—Carl Moyer programme	Multiple types, including on-road and off-road	US $28,000 per vehicle	Mandatory upgrade of highly polluting vehicles
US: Consumer Assistance to Recycle and Save	Light-duty vehicles	US $3,500–4,500	None
US: National Clean Diesel Campaign	Heavy-duty vehicles	US $9,400 per vehicle spent for programme	None
Germany Scrappage Bonus	Light-duty vehicles	US $3,500	Low-emission zones
China: National vehicle scrappage programme	Light and heavy duty vehicle	Varies by vehicle type US $980–2,940	Mandatory vehicle age limit
China: Local vehicle scrappage programme	Light and heavy duty vehicle	Varies by vehicle type LDV: US $410–2,410 HDV: US $1,330–2,100	Mandatory vehicle age limit and low emissions zones
Mexico: Programme to modernize Federal Road Transportation	Heavy-duty vehicles on federal highways	Up to 15 per cent of the cost of the replacement vehicle	None
Mexico City: Programme to replace microbuses with auto buses	City buses	Up to US $7,700	None
Chile: Swap our trucks	Heavy duty trucks	US $8,000–24,000 depending on vehicle category	Ministerial decree to implement a low-emission zone to be implemented

Source: Francisco Prosada D.V. Wagner, G. Bansal, R. Fernandez, 2015, White Paper on Survey of best practices in reducing emissions through vehicles replacement programme, International Council on Clean Transportation, mimeo, Washington.

The ICCT study has projected that the high emitters will become the largest contributor of particulate matter emissions globally by 2020 especially from Asia, Africa, and Latin America.[11] Older vehicles also have outdated power train technologies that adversely affect the fuel consumption and CO_2 emissions. The US and Germany have implemented vehicle replacement programme for fuel and CO_2 savings.

The governments also provide subsidies for voluntary retirement of vehicles. According to the ICCT, fiscal incentive should be higher than the current market value of the vehicle to be replaced so that owners scrap it and buy new vehicle. In Mexico, a GIZ study has found that if the incentive is 70 per cent of the cost of the new vehicles, the vehicle owners will opt to purchase a new vehicle. However, these programmes are not permanent in nature and the quantum of incentive may even decline over time.

Complementary policies to support vehicle retirement

Other complementary policies are being designed to discourage use of high-emitting vehicles and encourage owners to replace their vehicles. These include non-fiscal low-emission zones, age limits for vehicles, early action subsidies for retro fitment and repowering schemes, and schemes for operation exclusion. Establishment of low-emission zones offers serious restraint and incentive for disposing of old vehicles. For instance, Beijing, while offering subsidies for vehicle replacement, also restricted these vehicles from operating in low-emission zones of the city. In Europe, fees for entering low-emissions zones are differentiated based on vehicle emissions, whereby high emitters have to pay higher charges.

These policies together are creating conditions for retiring the huge in-use fleet that if not fully scrapped will enter the international market. The approach, however, varies with the country.

Japan

The regulatory periodic vehicle inspection (fitness test) programme in Japan is called Shaken. After a vehicle turns three years old, it must get an inspection every two years. All new cars are sold with a three-year *shaken* (warrant of fitness). Consequently, most vehicles available in the used market are three, five, seven and nine years old as they are usually traded in or sold by the user when the *shaken* expires, not as a result of a failed test.[12] *Shaken* is relatively expensive and together with rapid turnover of new models leads to large-scale retirement of vehicles. Reported estimates of the average inspection cost start at $1,000 and get as high as $2,500 per vehicle. Further renewals of the obligatory inspection certificates are required at two-year intervals.[13]

Many vehicle owners in Japan sell vehicles after five or seven years of usage, when the second or the third obligatory test under shaken is due or *shaken* expires. These second-hand or used vehicles have very poor market value within the domestic market and their export is increasing. The UNEP 2017 background paper on used vehicles states that strict regulations lead to a higher rate of depreciation in the value of automobiles in Japan than in countries with more lax regulations. This differential in depreciation rates creates the incentive for trade in used cars. [14]

End-of-life and recycling system in Japan: The law for recycling and ELV rules was enforced in 2005 to address the shortage of landfill sites for disposal of discarded vehicle waste. This also led to hike in vehicle recycling fees. The law systematically defines vehicle recycling through specifications for car manufacturers and importers as well as customers and government requirements.[15] Recycling is mandatory for all citizens and corporate entities and is governed by various laws.

The Japan Automotive Recycling System is designed to minimize illegal dumping possibilities by adopting a prior fee payment arrangement whereby the purchaser of a new vehicle must pay the recycling fee at the time of purchase, while the owner of an in-use vehicle must pay it at the time of the first periodic inspection.[16]

Moreover, ELVs are important for resources recycling in Japan. According to the Ministry of the Environment, the number of unlawful ELVs in Japan sharply declined from 126,000 units in August 2001 to only 35,064 in March 2007. The Shaken programme contributed to the decline.[17]

In Asia, both Japan and China have come up with end-of-pipe regulations (see *Table 21: Comparison of end-of-life (ELV) management systems between China and Japan*). But they have different levels of stringency.

A thriving trade has emerged in spare parts and components mined from scrapping and are an important export business in Japan. The used parts, removed from ELVs, are exported worldwide to wherever there are used-vehicle markets of Japanese vehicles. This is also needed to serve the overseas markets where used vehicles have been traded.[18]

Table 21: Comparison of end-of-life (ELV) management systems between China and Japan

	China	Japan
Government /involvement (through Act)	Statute 307 Law on ELV	End-of-life vehicle recycling law
Manufacturer involvement	None	Take back CFC, airbag unit, shredder dust
ELV age	10 years or 500,000 km	Minimum three years, inspection once in two years
Recycling fee paid by	Market-driven (collector pays last owner)	First owner, upon purchase
Operator size	367 recycling operators, one pilot recycling centre	5,000 recycling operators, 140 shredding and sorting plants
Effectiveness (recovery rate)	90 per cent	85 per ent
GDP per capita	7,536	33,994

Source: Proposed framework for end-of-life vehicle recycling system implementation in Malaysia, 11th Global Conference on Sustainable Manufacturing, 2013, Berlin, Germany, https://depositonce.tu-berlin.de/bitstream/11303/4987/1/azmi_etal.pdf

The European Union

European commission's EOL Directive (2000/53/EC) lays down the reuse rates for scrap cars: 80 per cent for reuse and recycling; 85 per cent for reuse as a whole. These rates increased to 85 and 95 percent respectively as of 2015. Moreover, the European Union member states adopted *Correspondents' Guidelines No. 9 on Shipments of Waste Vehicles*, to monitor. Improper vehicle dismantling and scrapping have adverse environmental impacts and valuable raw materials are lost, instead of being recycled. But it is important to get an insight into the operation of these systems to understand the imperatives of the used vehicle trade from countries of the European Union.

Germany

The EOL Directive (2000/53/EC) requires 85 per cent reuse and 95 per cent recycling respectively. They are based on waste statistics that the Federal Statistical Office (Statistisches Bundesamt) as well as regional-state statistics agencies collected from the relevant companies, in accordance with the Environmental Statistics Act (Umweltstatistikgesetz). Based on this the UBA determines the scrap-car recovery rate for Germany and submits the German report in this regard to the European Commission.

It is said that Germany has consistently exceeded EU recovery rates with an 89.2 per cent reuse/recycling rate and a 92.9 per cent recovery rate in 2008. In 2010, more scrap cars were recovered than were handed over to dismantling companies, owing to back inventory from the Cash for Clunkers programme.[20] The Germany bonus programme announced in 2009 was originally supported with €1.5 billion, subsidizing the purchase of 600,000 cars. Under the programme, the German government would pay to individuals to buy a new car meeting the then current emission standards as a replacement vehicle.[21]

Most scrapped cars are recycled in two stages. First, the cars are dismantled at one of around 1,300 certified dismantling centres, which drain all motor oil, antifreeze and other fluids from the cars and remove parts that contain pollutants such as lead batteries, spare parts and recyclable elements such as tyres and catalytic converters. The bodies are then shredded mechanically, with iron, aluminium and other metal scrap that is sold to scrap dealers, in some cases after undergoing additional processing. Scrap dealers melt down

the scrap into recyclable metal. 97 per cent of the metal in Germany's scrap cars is recycled. This also generates shredding residues that need to be disposed of; these are composed of plastic, rubber, glass, residual metals, and other materials, including pollutants. [22]

This process is governed by Directive 2000/53/EC. This law applies to cars, light-utility vehicles and three-wheel motor vehicles (excluding motor tricycles). The ELV regulation (a) requires automakers to take back scrap cars free of charge via a comprehensive network; (b) places restrictions on the use of mercury, cadmium, lead and hexavalent chrome in cars; (c) sets recovery rates; and (d) lays down technical requirements for scrap car reuse and recovery. Hence such cars may only be dismantled and scrapped by companies that have ELV regulation certification.

Used and scrapped car export from Germany is high: Over a million used cars are still exported from Germany each year, most to EU countries. According to the literature, a large share of these vehicles goes to West African nations and former Soviet bloc countries. Some of these cars are in good condition, while others are in relatively poor shape. It is often difficult to determine whether a given vehicle is usable or meant for the scrap heap. To address this issue, EU Member States have adopted Correspondents' Guidelines No. 9 on Shipments of Waste Vehicles, which though not legally binding helps officials monitor export and improper disposing of cars to be scrapped that are disguised as used cars (particularly outside the EU).

It was reported that German authorities have discovered illegal schemes through which an estimated 50,000 scrapped vehicles have been exported to Africa and Eastern Europe. [23] Preventing the export of these vehicles to Africa and Eastern Europe will require much tighter export rules and stronger proof of scrapping. For instance in the US, the Cash for Clunkers Programme required dealers to destroy old engines by draining the motor oil and injecting instead sodium silicate. But the German programme largely required the scrapped vehicles to be only sent to junkyards. This can also become a loophole for leakages and illegal exports.[24]

Sweden

As in the other countries, it is not possible to get proper estimates of number of vehicles that are scrapped and recycled or exported. There is one study that has estimated that 7 per cent of total cars out of use are exported or left to rust; 2 per cent of cars out of use go directly to material handling facilities, where in line with Directive 2000/53/EC they are prepared for shredding, hazardous materials removal and de-pollution. The remaining cars (91 per cent of cars out of use go to dismantlers to recover components and materials for reuse and recycling.[25]

However, old scrapped vehicles can still be found in the open. If the last owner of the vehicle can be identified they could be forced to pay a high fine.[26] A scrapping programme ended in 2007 in Sweden and was substituted by a programme in which the producer is mandated to, without any cost for the vehicle owner, take care of the scrapping of the vehicle. This aligns with EU-based directive 2000/53/EG (end-of-live vehicles directive). Authorized 'Junk Yard' issue a certificate of scrapping. The number of scrapped light duty vehicles since 2007 is in the range of 190,000/year. During the period of the scrapping programme, 250,000–300,000 vehicles were scrapped annually.

In Sweden recently there has been a proposal to introduce a revised scrapping

scheme. Depending upon the age and emission performance of the vehicle, it is proposed to pay a sum in the range of 5000–10,000 SEK (Swedish krona) to buy a new vehicle. It is also said that it is very time consuming and difficult to scrap a vehicle and earn some money out of the leftover. The information on legality of exporting used and scrapped vehicles from Sweden is not explicit and clear.

US

The US has implemented multiple programmes including Carl Moyer programme for on-road and off-road vehicles in California; Consumer Assistance to Recycle and Save (CARS) or cash for clunkers for light duty vehicles in the US, and National Clean Diesel Campaign Cash for heavy duty vehicles.

The first objective of the Cash for Clunkers was to provide temporary stimulus to counter the economic recession and provide financial incentives to car owners to trade in their old, less fuel-efficient vehicles and buy more fuel-efficient vehicles. The second was to improve the fuel efficiency of the existing stock of vehicles, in order to reduce emissions. This was administered by the National Highway Transportation Safety Administration (NHTSA) that allowed consumers to trade in older, less fuel-efficient vehicles for a voucher to be applied toward the purchase of newer, more fuel-efficient vehicles.[27]

After the 'clunker' was traded in at the dealership, its engine was destroyed, ensuring its permanent removal from the US vehicle fleet. Nearly 700,000 clunkers were traded in between 1 July 2009 and 24 August 2009 as part of the programme.[28]

An evaluation of this programme[29] shows that the programme led to slight improvement in fuel economy, and some reduction in carbon emissions. The cost per tonne of carbon dioxide reduced from the programme suggests that the programme was not a cost-effective way to reduce emissions, but it was more cost effective than other environmental policies like the tax subsidy for electric vehicles or the tax credit for ethanol.[30] Economically, about US $2.85 billion in vouchers provided by the programme had a small and short-lived impact on gross domestic product, 'and essentially shifted roughly a few billion dollars forward from the subsequent two quarters following the program'. [31]

These programmes are not likely to be continuous and frequent as there are both economic and environmental doubts about the real gains. Many economists have argued that the programme costs taxpayers $3 billion and that it did little to stimulate the US economy—even in the short run—because it helped foreign auto manufacturers at the expense of domestic manufacturers.[32] Environmental gains are also small.[33]

Extended producer responsibility

As the policies on circular economy is taking roots in the developed world, explicit rules are being laid out on extended producer responsibility to make the manufacturer or importers of vehicles responsible for the entire life cycle of the products. Manufacturers are required to reduce the overall environmental footprint of their products by reducing use of toxic and hazardous substances, increasing the use of recycled constituents, and enhancing ease of disassembly among others. The producers also have to provide for take back, recycling and final disposal of the product within the domestic economy.[34]

There is 'Individual producer responsibility' in which manufacturer or importer takes responsibility individually for its own products throughout the entire

life cycle including the collection and 'end-of-life management' through 'take back' or any other system. In 'Collective Producer Responsibility,' a number of producers, manufacturers, importers and other stakeholders come together as a consortium or establish an organization to take collective responsibility for the end-of-life management of products manufactured or imported. Nature of these interventions depends on the regulatory framework. This prescribes that the costs of managing post-consumer resources should be built into the cost of the product itself (see *Box: Application of extended producer responsibility in exporting countries*).

This progressive frame has a strong potential to inform the global circular economy. But it is not clear at this stage how its governing principles can be adopted for the international trade in used vehicles. How importers and manufacturers can be made responsible for imported products. But this needs to be assessed.

India

India, as a vehicle-exporting country in developing South Asia, has a different set of experiences and approaches, and a different set of imperatives. Being a vehicle-producer, it has adopted firm rules to stave off used-vehicle import. Any vehicle imported to India will have to meet the same standards that are currently in force and will have to be homologated according to the existing rules in India.

Application of extended producer responsibility in exporting countries

A review by the Central Pollution Control Board, GIZ and Indian non-profit Chintan has documented the application of the principle of extended producer responsibility in different vehicle exporting countries.

Regulatory approach

Europe: At the European level (EU) level, the end-of-life (ELV) Directive (2000/53/EC) mandates producer responsibility in which material and equipment manufacturers are obliged to use common component and material coding standards.

Germany: In Germany, extended producer responsibility obliges car manufacturers and importers to take back ELVs free of charge. In the Netherlands, a vehicle's first owner pays a recycling fee to the manufacturer, seller or importer from whom he purchases the car. In Korea, producers and importers are held responsible for the use of hazardous substances, recyclability of materials, ELV collection and information exchange. They are legally required to provide technical support to scrap dealers and ELV recyclers and to pay for costs if they exceed the benefit of recycling.

South Korea: The provisions are laid out in Korea's 2008 Act for Resource Recycling of Electrical and Electronic Equipment and EPR approach in its waste management policy. With the 2008 Act, this EPR approach has been developed into an 'Integrated Product Policy' that introduced an 'eco assurance system' that includes preventive actions such as environmentally friendly design and manufacture of products and follow-up management, i.e. environmentally sound waste management.

Japan: In Japan, the 2002 ELV Recycling Law provides for a 'shared responsibility principle' that obliges consumers to pay a fee when purchasing a new car or when handing in an old car bought before the law was enforced. The fee is deposited into a deposit management entity and operated by an electronic management system that confirms the actual ELV recycling. According to the Recycling Law, the responsibilities of automotive producers are the following: they should design for recycling; provide dismantling information to recycling operators; take back and recycle airbags, ASR and fluorocarbons; record waste recycling; specify the charging standard; and mark their name on the vehicle before selling it.

China: In China the 'Technology Policy for Auto Products Recycling' (2006) stipulates the strengthening of automotive producers' and importers' responsibility but so far not much progress has been made in that regard; thus the majority

India has not yet adopted any scrappage or end-of-life regulations. But a large number of vehicles are scrapped and stripped in Delhi, Kolkata, Pune, Jamshedpur, Indore, Chennai and several other places by informal, unregulated clusters across the country that have turned into hubs for scrap metal and all sorts of recovered and refurbished automobile parts.[35] India is working on a scrappage and recycling policy currently. This process got an impetus after the judiciary directed scrapping of 10-year-old diesel vehicles and 15-year-old petrol vehicles in cities like Delhi.

Estimates show that there were over 200 million motorized vehicles registered by 2015 and the sector is expected to grow at an average of 7 per cent for the next 20 years. This will require significant amounts of natural resources and can face resource restraints. Currently, the retired vehicles in India usually end up in the unorganized sector where after dismantling, auto components are either refurbished or sent for recycling. Material recovery remains low as workers lack both training and appropriate equipment needed to dismantle and recycle auto components. While some professional dismantling facilities exist, these are few and inadequate.[36] India needs a national ELV management system and a viable financial model for ELV disposal and recycling that integrates consumers, collectors, recyclers and producers.[37] (see *Box: India: Framing scrappage and recycling strategy*).

Being a vehicle producer, India requires its own end-of-life recycling and

of costs for recycling are borne by the recycling operators. In 2008 standards were proposed that make producers responsible for determining and marking the recoverability of different automobile parts.

US: In the US, there is no federal law governing EPR practices. The term usually used for EPR-related activities is 'product stewardship' that addresses producers, manufacturers, retailers, users and disposers alike and holds all these parties responsible for the reduction of a product's impact on the environment.

Initiatives by manufacturers

Some automobile manufacturing companies, such as BMW and Volkswagen in Germany and Toyota and Nissan in Japan, are known to facilitate the recycling and recovery of components from the ELVs of their own brand. Such companies either set up their own recycling plants or support recycling units. They also prescribe the procedure for handling and recycling their vehicles along with schematic diagrams in the form of brochures.

The BMW Group has established a 'Recycling and Dismantling Centre' in Munich, Germany, that serves as an authorized treatment facility and is also engaged in research and development for creating recycling concepts for future vehicles.

In 2007, the Volkswagen Group adopted a strategy. Volkswagen ELVs can be returned to a large number of take-back facilities operated by a Volkswagen subcontractor. All necessary information for dismantling and recycling is made available to the take-back facilities via the 'International Dismantling Information System'. An online platform was established together with a large number of international car manufacturers.

Volkswagen provides information and works on technologies for both component dismantling and post-shredder treatment. It runs its own operations for reuse of components after treatment.

The Toyota Motor Car Company started a joint venture with Toyota Metal Company in 1993 to develop ASR recycling technology and built the first automobile recycling plant in 1998 in Japan. Nissan is working on the standardization of recycling technologies to incorporate them in the design stage. The US automotive industry has formed the Vehicle Recycling Partnership (VRP) in 1992. Under this partnership Ford, Chrysler and General Motors coordinate collaborative research programmes to promote sustainable ELV recycling in North America and globally.

Source: Ashish Chaturvedi et al, 2012, The Story of a Dying Car in India, GIZ and Chintan, New Delhi, http://www.chintan-india.org/documents/research_and_reports/ELV-Report.pdf, as accessed on 16 March 2018.

recovery policies. This will require intervention to create professional infrastructure for dismantling and recycling of components.

Diesel bans to lead to dumping of diesel vehicles

Following Dieselgate and mounting evidence on very high on-road emissions from diesel light-duty vehicles, policies are evolving rapidly to discourage and phase out old diesel cars in Europe, which has dieselized the most. British, German and French authorities have released emissions results. A large number of popular diesel car models have failed to meet the official limit and are emitting six to 12 times higher on road in real-world conditions. Europe has reported a slowdown in sales during 2017. According to the European Automobile Manufacturers Association (ACEA), sale of petrol-powered cars overtook those of diesel in the first quarter of 2017 for the first time since 2009.

This trend is getting sharper with time. Madrid and Athens are banning diesel cars entirely. The sale of diesel cars has crashed in the UK. In London, pre-Euro VI cars are not to be allowed inside the ultra-low emission zone in Central London. According to the Society of Motor Manufacturers and Traders (SMMT), since 2016 sales have dropped by down 11.5 per cent as pollution fears grow in the UK. In fact, the UK government has announced that it would ban all new petrol and diesel cars and vans from 2040. The mayors of Paris and Athens have planned to ban diesel-engine cars in city centres by 2025. Paris will phase out pre-2011 diesel cars by the end of the decade. Copenhagen's mayor has announced plans to ban new diesel cars from entering the Danish capital. Diesel cars have lost market share even in Germany. The ICCT study links diesel emissions to 107,600 premature deaths globally in 2015. This push will get harder as countries take their climate commitments seriously.

India: Framing scrappage and recycling strategy

India is coming under pressure to deal with its ageing and old fleet. The Government of India is expected to issue its scrappage policy soon largely directed at the heavy-duty trucks and buses in which the replacement vehicle will comply with the upcoming Euro VI or Bharat Stage VI standards.

In the meantime, several city governments, including Delhi and the National Capital Region's and Kolkata's among others, have capped the age of targeted vehicles that can ply inside cities. Delhi does not allow more than 15-year-old commercial vehicles, 10-year-old diesel cars and 15-year-old petrol cars inside the city anymore. This has led to an enormous disposal problem. Measures targeted at addressing the older vehicles are creating a huge pool of old vehicles that if not properly addressed can become part of grey market.

The National Green Tribunal (NGT) has even directed other state governments to identify areas with less pollution where such older vehicles can be resold. But transporting pollution to clean environment is not a solution. Similarly, yet another directive from NGT has directed the Delhi government to find land for disposal. Even this is not an adequate solution if proper scrappage and recycling policies are not in place.

The government of Delhi has already issued a draft notification on scrappage to define more clearly the process of collecting, dismantling, recycling and reuse requirements. Widely abandoned junk vehicles on Delhi's roads and in parking places is a serious problem. Several other state governments in India, including Karnataka's and Maharashtra's, have come up with green tax for older vehicles. But these are more revenue-generating initiatives than disincentives for older vehicles.

Currently, a huge informal market has emerged for scrapping and recycling of old vehicles and components. The vehicles that are not used anymore or are old or damaged are generally traded for scrap in India. They are currently treated

These policies will now lead to a huge heap in advanced markets of discarded diesel cars and SUVs that will get dumped in low-income countries. Cheaper imports are already pushing markets towards bigger diesel engines in the car and SUV market of Africa and South Asia that do not have clean diesel. This requires a strategy to prevent dumping of discarded diesel cars with toxic emissions in low-income countries.

Spotlight on heavy-duty vehicles

Evidently, scrappage and end-of-life regulations are comparatively weakly enforced in case of heavy duty vehicles. Most scrappage schemes target light duty vehicles. However, there are fewer scrappage schemes for trucks. International Energy Agency has listed some of the scrappage schemes for trucks (see *Table 22: Scrappage schemes for trucks*).[38]

Japan government's policy is targeted at all types of four-wheel vehicles, including large vehicles and commercial vehicles, such as trucks and buses and is regulated.[39]

Available evidence shows that dismantling and recycling of end-of-life heavy-duty vehicles is still a small market compared to the volume of resale and export as that is currently commercially more viable. But this raises concern around the ultimate end of life recycling of these heavy vehicles.[40] According to the literature, there are rarely specific EoL treatment facilities dedicated to heavy vehicles, unlike light vehicles. There are some dismantling facilities for heavy vehicles in Europe for re-manufacturing, refurbishing and reuse, which are operating well.[41] The EoL management of heavy-duty vehicles is still small and poorly structured in Europe. This is often voluntary and not fostered by recycling targets or extended producer responsibility. [42]

by a large, unaccounted informal sector. According to a report by Automotive Recycler's Association's report on end-of-life of vehicles, 2012, India houses well over 100,000 family-run units that are involved in dismantling old cars and motorcycles, and recovering parts for sale.[1]

Chintan, a non-government organization working for the welfare and rights of people engaged in informal recycling, conducted a fact-finding study in 2011 and reported that more than 3000 such units operate within Delhi. A more recent report titled 'Analysis of ELV in India', jointly drafted by GIZ, CPCB and Chintan Environmental Research and Action Group, provides an overview of the current ELV market in India.[2]

The informal sector primarily consists of traders, dismantlers, scrap dealers and recyclers. The report points out that this sector despite being informal in nature is highly specialized. For instance, there are traders who deal only in engines or steel rims or tyres. Parts sold as scrap have their dedicated markets. Some of the key challenges that the informal ELV market currently faces is related to space crunch. Shortage of space is a significant impediment towards business expansion. There is limited access to financial and technical assistance. Though there is a thriving recycled component market to serve markets where Indian vehicles go, sophisticated marketing is needed to link dismantled parts with suitable markets.

Even though the government has started policy formulation on formal scrappage systems, authorized systems are very few. Details of regulatory provisions regarding scrappage, end of life, their enforcement and reporting mechanisms and other related aspects are still awaited.

Sources:

1. *Report On End-of-Life Vehicles Worldwide , Automobile Recycler's Association. Accesses from: http://a-r-a.org/automotive-recycling-magazine/report-on-end-of-life-vehicles-worldwide/*
2. *Chintan, GIZ and CPCB, 2015, Analysis of End of Life Vehicles (ELVs) Sector in India, Mimeo and Story of a Dying Car In India, 2013.*

Table 22: Scrappage schemes for trucks

Country	Scrappage scheme	Year of operation	Truck criteria	Premium offered
Chile	Cambia tu camión	2009	> 10t GVW; > 25 years old	US $9,000–22,000
China	Old-Swap-New	2009–10	10–15 years old	US $1,400–2,400
Colombia	Renovación Vehicular	2013–18	> 20 years old	US $24,600
Egypt	Egypt Vehicle Scrapping and Recycling Programme	2011–21	> 19 years old	US $700
Japan	Vehicle replacement programme	2009–10	> 13 years old	US $3,600–16,000
Mexico	Esquema de Sustitución y Renovación Vehicular	2003–18	> 10 years old	15 per cent toward the trade in of a new HFT
Spain	PIVE 1-8	2012–16	> 10-year-old LCVs only	US $1,800

Source: OECD/IEA 2017, The Future of Trucks: Implications for energy and the environment, International Energy Agency, https://www.iea.org/publications/freepublications/publication/TheFutureofTrucksImplicationsforEnergyandtheEnvironment.pdf

These overhauled vehicles are exported to developing countries that do not have the means to dismantle and recycle heavy vehicles properly at the end of their life-spans.

According to the Centre for Remanufacturing and Reuse in the UK, out of all heavy vehicles reaching their end of life, 50 per cent are reused or resold in other countries after major refurbishment, 43 per cent are re-manufactured to extend their lifespan in the UK, and 7 per cent are dismantled and recycled in the UK. In Sweden, approximately 50 per cent of trucks were estimated to be exported after five years of domestic use. These trucks are usually resold after five years of use to intermediaries who export to Eastern Europe and Africa. After five years in use, the original manufacturer warranty usually expires.[43]

There are limited elaborate end-of-life regulations for the heavy duty industries. According to studies, these are largely governed by cross-sector regulations, such as end of life for tyres, oil etc. Heavy-duty vehicles use more re-manufactured components, and components are four to five times more expensive.[44] Heavy-duty spare parts handling and processing are very heterogeneous. Some components qualify for profitable re-manufacturing, including tyres, alternators and starters, which account for nearly 70 per cent of the re-manufactured market. But catalytic converters and pneumatic brakes are largely replaced by brand new parts.

Data on international trade in used heavy-duty vehicle is very limited. There is supposed to be a substantial trade in refurbished used vehicles and components. However, local data from countries in Africa show the average age of commercial and cargo vehicle are lower than that of personal cars. But the larger issue that needs to be addressed is managing their on-road emissions and EoL disposal to recover valuable material that otherwise is getting lost as these vehicles are not going through the end-of-life processing in advanced countries. Increasingly, policies on circular economy in Europe etc. will aim to recover material from this segment.

Export market in spare parts: As the export market in old and used vehicles is expanding, it is also leading to large-scale export of spare parts from developing

countries to meet the demand for appropriate spare parts for the makes and models being imported in developing countries. It is said that this trade will have to be more organized more efficiently to service the entire value chain spread across continents. This market will become more complex and volatile when import regulations will speed up renewal of the on-road fleet; faster and newer genres of vehicles will penetrate. Manufacturer-led dealerships will have to maintain a critical mass of service components and spare parts in these markets. As the experience in India shows, with growing sophistication in OEMs' production, the scope of reusing parts from the older fleet gets limited and reduced. As a result, a large part of used spare parts that could be reused becomes scrap and waste and that reduces overall material efficiency.

Exporting countries need to be the partner in change

Clearly, while exporting countries are increasingly tightening rules and regulations for old vehicles for their respective domestic markets, there will be a massive spillover of discarded vehicles in the international arena. These will continue to roll in the developing world and lock in enormous pollution and greenhouse gas emissions for an extended period of time, negating the effect of the stricter action in exporting countries. Finding and enabling solutions to prevent a massive spillover of discarded old vehicles in the international arena across geographies and markets therefore requires shared responsibility.

SECTION 6: Next steps and the global mechanism

The role of old and used vehicles in aggravating pollution, ill health and climate change risks along with safety hazards in the developing world requires global recognition and action. Importing countries as well as exporting countries need to act quickly to promote a well-governed circular economy around vehicles to prevent 'environmental dumping' of clunkers. But there is no clear template to define and address the problem. Used-vehicle trade is also coming in the way of recovering valuable materials from scrapped vehicles in this resource-constrained world.

Vehicle-importing countries have at least begun to discuss and shape regulations. They are putting up barriers of age cap, tax measures and minimal environmental and safety standards to stave off the dirtiest segments. But such unilateral action only on the part of the low-income countries will not help to address the problem.

An equally strong role will have to be played by the exporting countries to ensure that used vehicles meet the requisite emission requirements and safety standards and vehicles have adequate economic life left before they are exported to other countries. As UNEP says, 'exporting countries will also have to strengthen their own recycling and reuse policies within the economy to ensure effective compliance to avoid dumping'.[1]

This will require international agreements and platforms to mediate and develop oversight and set guidance for global trade and establish accountability and responsibility. This is one of the weakest links in this trade. As Michael P. Walsh, chairperson of the working group set up under the aegis of the Partnership for Clean Fuels and Vehicles of UNEP to assess used vehicle trade, says, 'It takes two to tango. Exporting countries must play an important role just as they must with hazardous waste. Exporting countries have the expertise and the technical capacity to distinguish between safe and relatively clean vehicles and those which are unsafe and highly polluting. On the other hand, some of the importing countries lack that capacity. Also in especially poor countries, there will likely be some demand for anything that will roll and the exporting countries cannot allow the citizens in those countries to be exposed to dirty, unsafe vehicles just as they can't allow them to be recipients of hazardous waste.'

The way forward

Coordinated action based on shared responsibility is needed in vehicle-importing as well as -exporting countries to prevent dumping of clunkers in the poor world. The majority of importing countries extending the life of vehicles much beyond their legally acceptable useful life are accumulating enormous clunkers. Countries will have to invest in huge capacities and preparedness to deal with post-consumer waste. If the scope for recycling and reuse is not done properly it can impose huge systemic costs on the economy and environment.

Action in vehicle-importing countries

Need harmonized action on age caps, fiscal measures and other import criteria: When capacity in most importing countries to technically assess roadworthiness and emission performance of each imported vehicle is weak, the most immediate and feasible strategy is to adopt an age cap to weed out extremely polluting, unsafe and uneconomical vehicles. A complete ban on

used vehicles may not be possible immediately in many importing countries immediately. But an age cap will allow utilization of a substantial part of the remaining useful economic life of the younger imported fleet while eliminating the highly polluting vehicles. But the ultimate objective should be to ban import of used vehicles. Well-established criteria will have to be adopted by exporting and importing countries to screen vehicles based on age, emissions and safety performance, history of accident, damage and recall.

So far only four countries in Africa and three countries in South Asia have succeeded in completely banning import of used vehicles. As many as 25 countries in Africa and most in South Asia have imposed age restrictions. But age restriction is widely divergent—from three to 15 years. This needs to be harmonized to below three to five years. Divergent age caps create scope for leakages through porous borders and re-export.

Further, the fiscal strategy of imposing higher tariff on older vehicles will have to be designed for effective reduction in import of old and polluting vehicles. It should not create a perverse incentive for older vehicles over newer ones. Even after an ambitious hefty tax their price remains low and attractive compared to newer vehicles. Thus eliminating very old vehicles from the market is critical to making fiscal measures work.

Countries will have to align their strategies. Harmonized action will help to create bottom-up pressure on the international market and also plug leakages.

Harmonize emissions standards and fuel quality at the minimum level of Euro IV with 50 ppm sulphur fuels: There is growing consensus among regulators as well as multilateral agencies such as UNEP that for global trade in vehicles, Euro IV should be the minimum harmonized standard for both import and export. This by default eliminates all vehicles that are lesser than the Euro IV from the export stream. It will also help stabilize prices for the acceptable fleet in the international market and not undercut regulatory action in importing countries that are trying to establish an age cap as well as minimum emission standards. Global exporters will have to follow the age cap and emission standards requirements for international trade and this will have to be multilaterally established for a harmonized approach. Importing countries cannot gain from regulatory restrictions on age to bring cleaner, younger and more fuel-efficient vehicles if fuel quality and emissions standards do not improve.

Several countries in Africa and South Asia are also developing their own manufacturing and assembly capacities and are adopting restrictive import policies in terms higher import tariffs to stave off influx of cheap and old vehicles. But this will also require emissions and safety standards and quality control for domestic production. Domestic regulations can then become the basis of import as is the practice in India.

Fuel economy measures need to be combined with improvement in emissions standards and fuel quality: This is needed to prevent trade-off between fuel efficiency and higher emissions. This is particularly important now as several exporting countries are phasing out diesel cars to combat air pollution. These are all likely to find their way to importing countries that do not have clean diesel. Countries like Mauritius that had implemented CO_2 emissions-based import without clean diesel and commensurate emissions standard could have become vulnerable to a large influx of diesel vehicles. But this did not happen because of the very narrow gap between diesel and petrol prices, higher

tax on bigger engines and consumer preference for petrol vehicles. But this may not be the case in other countries. The discarded diesel fleet will lock in toxic pollution and heat-trapping black carbon and lead to more illness in the developing world.

Implement inspection system for emissions, roadworthiness and safety in importing countries: Increasingly, several countries such as Uganda, Kenya, Nigeria, Sri Lanka and Bangladesh have begun to set up vehicle inspection centres for on-road emission and roadworthiness tests. But the inspection centres will have to be organized at a different level—at the point of entry and subsequently periodically.

Need harmonized protocol vehicle registration and documentation systems: Regulation of import will require protocol for vehicle registration and checking of authentic documents on emissions and safety status of vehicles to be obtained from dealers and sellers. It needs to record date of manufacturing, original emission standards, export certification system, chassis details, fuel type, status of official inspection at the time of export, and other relevant details based on a clear protocol. CSE has reviewed the vehicle registration system in cities like Addis Ababa and Abuja and found that such details are not recorded.

The exporting countries will also have to maintain transparent and publicly available databases on the emissions and safety and inspection status of vehicles. The entire dealership chain will have to be made accountable and responsible to follow the protocol. Importing countries may increasingly show interest in linking imports with emissions and fuel economy status of vehicles. Countries need explicit systems of oversight and monitoring as well as accountability of dealers. These systems should be developed further and replicated. Exporting countries have a role to play in addressing these challenges and creating transparent information for the supply chain.

Enable scrappage and end-of-life regulations and implementation in importing countries: Low- and middle-income countries will have to deal with the final disposal of the fleet as these vehicles cannot be reused or resold anywhere else. The costs of disposal and recycling rest on these countries and place enormous economic burden on them. Importing countries so far have not accounted for such costs. Moreover, the potential of recovering valuable material—an important part of circular economy—remains underutilized.

This will have to be part of shared responsibilities. The importing companies as well as exporting governments through bilateral and multilateral arrangements need to create mechanism for supporting scrapping and recycling in the low-income countries. This will require a common set of criteria for the region to declare end-of-life of vehicles for recycling. Most countries in Africa and South Asia do not have an adequate inspection system for roadworthiness, emissions and safety. This often makes an arbitrary cut off of age the decisive factor to scrap vehicles.

This sector will require legal support for end of life and dismantling and de-registering a vehicle for it to qualify as an ELV and for its disposal. In India, for instance, unless it is declared so, a vehicle cannot be traded as scrap according to the Motor Vehicles Act 1956 and successive amendments.[2] This poses an obstacle to the few formal recyclers in the ELV industry. The governments will have to develop a legislative framework, recycling infrastructure upgrading existing value chains, incentive structures to salvage reusable ELV parts,

and effective collection and channelization mechanisms that leverage the informal sector. Dealers need to be an important link between consumers and manufacturers or consumers and dismantlers.

The used-vehicle market has its own demand for appropriate spare parts for the makes and models being imported. Even this trade will have to be organized more efficiently to service the entire value chain spread across continents. This is volatile as renewal of the on-road fleet makes older spare parts obsolete. Manufacturers and dealers will have to maintain a critical mass of service components and spare parts in these markets.

Need consumer information and incentive for informed choice: Consumers in importing countries of Africa largely depend on the internet for purchase decisions. For instance, according to UNEP in Nigeria, internet-based sales account for 90 per cent of total purchases.[3] Several trade websites have mushroomed but are not certified by the governments. It is difficult to find website that sell certified used vehicles or any official websites giving out credible information status of certification, safety, road worthiness, emissions or fuel economy in the exporting countries.

For informed consumer choice, access to public available databases must be ensured. Advanced countries, for instance, have web-based consumer information systems for consumers. The US EPA's Green Vehicle Guide provides detailed user-friendly information about green vehicles.[4] Its 'SmartWay vehicle' or vehicle fuel economy labels provide information on fuel economy, fuel costs and environmental impacts. This includes information on energy impact score, GHG score, EPA smog rating, safety-related information like Crash Test Results etc. The US government's National Motor Vehicle Title Information System (NMVTIS)[5] is designed to protect consumers from fraud and unsafe vehicles and to keep stolen vehicles from being resold. The Federal Trade Commission's (FTC) Used Car Rule requires dealers to display a Buyers Guide in every used car they offer for sale, and to give it to buyers after the sale.

Websites in Japan, approved by the Japan Government's Ministry of Economy, Trade and Industry-approved Japan Used Motor Vehicle Exporters Association (JUMVEA),[6] provide approved information from Japanese automakers. They provide details necessary to buy the vehicle, including emissions, fuel economy, safety other details.

In Europe, New Car Assessment Programme (NCAP) is a vehicle-safety-rating system determined by a series of vehicle tests, designed and carried out by Euro NCAP. These tests represent, in a simplified way, important real-life accident scenarios that could result in injured or killed car occupants or other road users.

The challenge is to find a global mechanism for integrating these databases to inform the global supply chain and integrate with the protocol of vehicle registration for export and import.

Promote shared responsibility of the exporting countries to filter out old and damaged vehicles from export: Action on used and old vehicle trade cannot be addressed only with unilateral measures in importing countries. The trade pressure from exporting countries can be intense if these countries are not made accountable and responsible for a circular economy. As more and more importing countries begin to put barriers to trade in used vehicles, export will also fall drastically. For instance, in the US, they found that countries

that have preventive barriers to used-vehicle imports were associated with 67 per cent fewer US exports to that country.[7] Emissions in importing countries can be hugely avoided if these vehicles are scrapped rather than exported. The emissions caused by these vehicles are higher when they have had little maintenance and belong to larger engines and higher weight categories.[8]

Need stringent measures in exporting countries for verification of vehicles for safety, emissions and road worthiness: Currently there is little incentive in exporting countries to have foolproof and robust systems to intercept all end-of-life vehicles, vehicles with compromised safety and emission performance or accident-affected vehicles to stop them from entering the international market. Strong exit rules are needed to verify, inspect, certify and codify in a transparent manner before any vehicle is exported. That the vehicle and chassis identification number is not tampered with must be ensured. All end-of-life vehicles, damaged vehicles and vehicles with compromised emissions and safety features need to be barred from export.

There has to be an online database for verification by the importing countries, dealers and consumers. It is important to establish through a multilateral process essential documents that all exporters and importers must display at the time of exit and entry and registration. There are anecdotal reports that suggest during the process of transshipment, there is considerable stripping of vehicles in re-exporting zones in the Middle East and elsewhere to remove advanced emission-control systems which are not appropriate for the importing countries that do not have appropriate fuels. It is not known what happens to the safety gears in the vehicles. There is no clarity on how this supply chain should be monitored. Monitoring the safety chain is needed to assess the status of safety gadgets in the vehicle. The dealer's chains will have to be made accountable.

Need accountability and adaptation of Extended Producer Responsibility for global supply chain: How can the approach of establishing manufacturers' and dealers' responsibility and Extended Producer Responsibility (EPR) that makes the manufacturer or importer of vehicles responsible for the entire life cycle of the product work in vehicle-importing countries? A review of such a strategy by the Indian government[9] shows that the EPR strategy has been adopted by high-income countries where manufacturers are required to reduce the overall environmental footprint of their products by reducing use of toxic and hazardous substances, increasing use of recycled constituents and enhancing ease of disassembly among other steps. Producers also have to provide for the take-back, recycling and final disposal of the product within the domestic economy.[10]

How can this be taken forward for importing countries? Of course, it will have to be read with the rider that this should not work as extra-jurisdictional reach of other governments and undermine sovereignty. But there has to be a global mechanism to identify the responsibility and participation of stakeholders, including consumers, producers, recyclers and dealers in the supply chain. There is useful experience in Mauritius in the way they have established the procedure for warranty and guarantee with the suppliers as well as certification agencies in the country of origin. This will have to be resolved through intergovernmental consultation. Just as producers are establishing collection and recycling facilities in their respective domains, similar efforts will have to be made as part of shared responsibility in importing countries.

Thus, governments, through bilateral and multilateral processes, as well as

manufacturers and dealers will have to support establishment of end-of-life and recycling facilities in importing countries.

Vehicle-importing countries need public transport strategies and vehicle-restraint policies to reduce inflow of used cars: The biggest advantage for vehicle-importing countries in Africa and South Asia is their strong legacy and baseline of public-transport use, walking and cycling. Close to 70–80 per cent of their daily travel trips are through these sustainable modes. In cities like Addis Ababa, the share of public transport, para-transit and walk trips is as high as 90 per cent. This needs celebration and protection. Globally, high-income vehicle-exporting countries with very high transport-energy intensity, are trying to adopt policies to reverse automobile dependence and increase share of sustainable modes. If vehicle-importing countries in the developing world succeed in protecting, modernizing and integrating public-transport systems with efficient last-mile connectivity in the early stages of motorization, they can avert the risk of car dependence and locking in of energy intensity and pollution. Such strategies can contribute significantly towards reducing car import.

Leveraging multilateral forums to govern international trade in used vehicles

Mitigation of this problem through shared responsibility is important as vehicles produced in high-income countries continue to emit for a considerable part of their lifespan in low-income countries. There is no clear multilateral forum that has explicitly taken this issue on board. Even though there is global concern over 'environmental dumping' of high-polluting vehicles to the least well-off economies, there is no clear template to define and address the problem. The question and solution are still exploratory.

Leveraging trade forums: Literature hints at discussions on used-vehicle import in the World Trade Organization (WTO). This is evident from the review carried out by the Global Fuel Economy Initiative in 2013 in the context of import of used vehicles to Mexico from the US.[11] The review has highlighted that though several countries have already put up import barriers to used vehicles, there has been no significant opposition or attempt to block such measures in the WTO.

The grounds for discrimination against the import of second-hand vehicles given especially by Latin American countries have included safety and environmental concerns, and problems with valuation and protection against fraud and corruption. Colombia has cited Article XX (b) of GATT 1994, which allows general exceptions for countries to accomplish 'non-economic' objectives, including the safety and health of human, plant and animal life. To justify domestic protectionist policies in WTO, Brazil has cited customs valuation concerns and the potential for fraud, and 'negative impacts for the environment and public safety arising from the commercialization of used consumer goods in the domestic market'.[12] Brazil has also pointed out that such policies were common to many WTO Members and bans should not be considered as distorting trade.

India has fought the used-vehicle import very hard during 2007–09 to protect its own industry and has its policy to ban such import and make it a legal requirement that all imported vehicles meet the current emission standards in force in India.

However, as the experience of Mexico has shown, importing countries can come under pressure in free trade zones such as NAFTA, where a unilateral decision to impose an age-based ban may become difficult. After signing NAFTA, Mexico

had opted for a policy reversal in which 10–15-year-old vehicles from the US and Canada were allowed once again to the detriment of the environment. Thus, a roadmap for a circular economy will have to be included in all trade negotiations.

Multilateral environmental forums: Multilateral environmental forums on climate change such as UNFCCC need to explore the possibility of facilitating dialogue and decisions on the framework that should govern used-vehicle trade. The Partnership on Vehicles and Fuel Quality of the United Nations Environment Programme (UNEP) is currently evaluating used-vehicle trade to chart the roadmap for action. This may be taken forward to influence multilateral strategies and national policies to set the terms of global trade. This trade has huge implications for climate impacts as old vehicles with highly inefficient engines and malfunction incite energy guzzling and lock in CO_2 and black carbon. Moreover, cheap used vehicles allow the market to shift steadily towards bigger vehicles, which undermines the inherent advantage of the small-car market of South Asia and Africa.

International cooperation: Yet another platform that needs to be explored and leveraged is international forums and blocks of governments. Some international forums such as G8, G20 and BASIC have begun to place the sustainability agenda on the table as well as the importance of integrating the framework of a circular economy for the security of the supply of resources and environmental sustainability.

G20, for example, is more explicit in its discussions. It has begun the discussion on developing frameworks to enhance a circular economy, sustainable production and consumption. Circular economy is now getting linked with the 2030 Agenda for Sustainable Development and the Paris Agreement. It is expected to bring more transparency across global supply chains and facilitate financing for establishing circular supply chains.[13] A policy brief of the G20 group states that G20 governments should support transparency across global supply chains regarding the origins and content of circular products and materials by supporting development of standards and labels as part of 'sharing economy' or 'collaborative economy'. It states that countries require an agreed common framework of indicators to monitor the performance of countries and companies worldwide[14] to respect resource-efficient principles. This requires knowledge sharing among countries to ensure trading in goods is 'circular' and not hazardous.[15] Multilateral platforms can develop a common framework of indicators to monitor the performance of the circular economy of companies worldwide, and look at the performance and life expectancy of products as the original ones.

Such discussions create the opportunity for including used vehicles in the trade and multilateral negotiations on circular and hazardous trade.

Involve manufacturers and dealers: Manufacturers and dealers are involved in global supply chains. This complex chain needs transparency regarding the origin and content of circular products and materials and collaboration among different industries along the supply chains. The governments can support the development of labelling and declaration of content of products and materials and ensure resource-efficient supply chains. In Europe, companies such as Volvo, Toyota and Volkswagen have begun to take the responsibility for the final disposal of their products. It will be worth exploring how manufacturers or their franchisees or dealers can replicate such systems globally.

Annexure: CSE consultation on the issue of vehicle import

Centre for Science and Environment has initiated region-wise consultation process in Africa and South Asia on the challenges and solutions for used vehicle import. Periodic consultations with the regulators and concerned stakeholders have been carried out in Nairobi, Delhi and Zanzibar to review the issues, status, roadmap and gain local insight in a participatory manner to chart a roadmap. This has helped to get deeper insight into the emerging issues and solutions needed at the national, regional and global level. Those who participated in this consultation process and have contributed deeply to the understanding of the issues are as follow:

Africa

Ethiopia
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Multilateral body

United Nations Environment Programme
Rob Jong, United Nations Environment Programme
Jane Akumu, United Nations Environment Programme

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