A multi-year program for scrapping polluting and unsafe vehicles

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איגוד יבואני הרכב בישראל ע"ר
Israel Vehicle Importers Association

INDEX

A. INTRODUCTION

The coming decade will see a significant technological revolution in the automotive industry. Electric vehicles will reduce direct emissions from vehicles to zero and autonomous / semi-autonomous systems will allow entry of "zero-accident vehicles" into the market towards the middle of the decade. While the green taxation regulations encourage the entry of new and non-polluting vehicles onto Israeli roads, there is currently no incentive system for removing old vehicles from the Israeli car parc. This type of incentive is the order of the day, due to the mix of vehicles in the Israeli vehicle fleet, which is characterized by a large number of very mature vehicles, and to the fact that mature vehicles have, already now, significantly inferior levels of pollution and safety. Beyond that, the gap between older vehicles and newer vehicles is expected to worsen exponentially.

Today, the median age of vehicles being scrapped in Israel is one of the highest in the world, standing at 15.5 years, while in other countries it is only 13-14 years, and in some even 11 years. Israel's being a transportation island, combined with high taxation, makes the export of used vehicles uneconomical, and they age on Israeli roads. **In the final stages of a vehicle's life, pollutant emissions increase dramatically, and the chances of being involved in an accident increase up to three fold**. Old, polluting vehicles with a poor safety level can be a real obstacle on the way to roads free of pollution and accidents, a national goal that Israel, as a developed country, is striving to achieve in the foreseeable future.

The current incentive mechanism does not encourage the removal of old vehicles from the road. The opposite is true - old vehicle owners enjoy a cheaper annual licensing fee, discounted insurance premiums and negligible vehicle value erosion. Thus, the owner of a vehicle that has reached old age is not encouraged to take it off the road, but rather to keep it until it is "dead". **The combination of the basic market failures, the existing set of incentives, and the benefits inherent in rejuvenating the vehicle fleet, require the formulation of an initiated program to remove old vehicles from Israeli roads**.

The first thing that comes to the decision makers' minds in these cases is a traditional scrapping program, as implemented from time to time in Israel. Such programs have historically been characterized by:

1. A low budget in relation to the need;
2. Uncertainty regarding the duration of the program and the budget available for it;
3. Setting criteria for participation and the amount of compensation which usually lead to the scrapping of extremely old vehicles (20+ years old). These vehicles would probably have been deducted from the car parc in any case shortly after the implementation of the program. Thus, the Israeli scrapping programs haven't until now been effective in bringing about a significant rejuvenation of the vehicle fleet, and accordingly the decision makers are not happy to implement them and allocate them significant budgets.

This paper will propose an innovative scrapping program that allows for the first time to address the issue of outdated vehicles on the road, which is based on the following principles:

1. Incentivizing the scrapping of vehicles in an effective age range (9-14), which will lead to a significant rejuvenation of the Israeli vehicle fleet;
2. A program that increases the state's revenues, and does not require an additional budget on the expenditure side;
3. An ongoing program with clear criteria, which allows the owners of the vehicles to make an informed decision about the desired time for scrapping them.

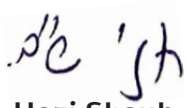
The implementation of a program of the type described will result in the scrapping of an additional 600,000 vehicles over the next decade (beyond the natural scrapping), in the lowering of the median age of vehicles taken off the road to 12 years, and in a significant addition to the state budget. In light of the Covid-19 crisis, this move could be part of the government's "toolbox" for encouraging increased private consumption, increasing the state's revenues and encouraging economic growth.

As we write these lines we are experiencing the economic impacts of the Covid-19 crisis on the automotive market and the economy as a whole. We are convinced that, precisely at such times, the immediate implementation of a scrapping program is necessary for the economic recovery of the Israeli economy, as is customary in times of economic crisis in many countries around the world.

We hope that this paper will motivate decision-makers, particularly in the Ministries of Transport, Finance and Environmental Protection, to take action, in order to enable the proper preparation of the vehicle sector for the coming decade.

Finally, we would like to thank all those (in Israel and abroad) who assisted us in collecting the data, analyzing it, performing peer control and testing the feasibility of the model.

Yaki Enoch
President



Hezi Shayb
CEO

Nadav Caspi
Economist

B. Executive summary

The median life expectancy of a vehicle in Israel is among the highest in the developed world, standing at 15.5 years. In 2017, there were about 327,000 vehicles aged 15 years and over on Israeli roads, and another 777,000 vehicles aged 9-14 years. Vehicles aged 9 years and above constitute 31% of all vehicles in Israel.

Leaving old vehicles on the road has significant negative consequences for the economy, such as:

Safety implications – According to recent Central Bureau of Statistics data, older vehicles are involved in accidents more than 2.5 times as much as new vehicles, due to technological and mechanical gaps that grow exponentially over the years. Added to this are forecasts regarding the entry into the market of autonomous vehicles, including "zero-accident" vehicles, which will require a gradual but determined scrapping of older vehicles in the coming decades.

Environmental implications – Technological developments allow, inter alia, the production of less polluting vehicles, a reduction that culminates with the electric vehicles. Air pollution caused by motor vehicles, and even more so by older vehicles, has health and economic consequences for the economy. Local exhaust gas emissions have been proven to significantly harm the public's health, and greenhouse gas emissions are thwarting the international move to minimize climate damage. Removal of old and polluting vehicles is the need of the hour, and will contribute to reducing air pollution and meeting the government's emissions targets, as well as the targets to which Israel intends to commit itself to the UN Conference, COP 26.

Budgetary implications – Finally, along with an increase in GDP, the scrapping of old vehicles is the only factor that contributes to an increase in the purchase of new vehicles. This means that a program to incentivize the scrapping of old vehicles, which aims to reduce the median life expectancy of vehicles in Israel from 15.5 to 12 (similar to other developed countries), can, in our estimate, contribute **about NIS 30 billion to the state coffers** over the next decade, from direct taxes, customs fees and VAT on the purchase of new vehicles.

Despite the above, and despite the fact that there are incentives in the Israeli economy for purchasing "greener" vehicles, **there is currently a lack of incentives to take old vehicles off the road**, and there are even regulations in the vehicle market that encourage the consumers to act in an opposite way to that which is desired in this respect.

Notable elements that hinder the natural scrapping process in Israel are:

A. **licensing fee which decreases as the vehicle ages, becoming unsafe and polluting.**
B. **Vehicle insurance that is not affected by the age of the vehicle, and even offers affordable alternatives to owners of old vehicles.**
C. **The lack of a monetary incentive for scrapping an old vehicle.**

The result is vehicles that "rust" on the roads until they reach dismantling or an accident. **In the "business as usual" mode, more than 600,000 vehicles aged 15 years and over and about 1.2 million vehicles aged 9-14 years are expected to be on the Israeli roads in 2030.**

However, there is a high probability that due to technological changes, which raise public expectation of an increase in road safety and the reduction of air pollution, the government will be required in the next decade to come up with extensive and expensive programs for scrapping hundreds of thousands of vehicles, including vehicles currently perceived as relatively new. **The sooner the state prepares for the new reality and produces a clever, sustained and budget-balanced incentive program, the more properly it will be prepared for the new reality without the need for huge budgets or harming the economy.**

Previous programs for scrapping old vehicles from the Israeli vehicle fleet have been characterized by a number of planning failures:

A. **The lack of an ongoing budgetary source –** the programs did not indicate an immediate source of income to cover their high cost, and thus, despite their economic viability and their benefit to the economy, which was studied by a number of entities in real-time, budget constraints and current health, education and security needs pushed these programs to the bottom of the national order of priorities, leading to their being cut off long before reaching the required targets, and not being renewed.

B. **The lack of consistency –** the traditional programs are one-off and unanticipated campaigns, so vehicle owners cannot plan their actions in advance or make an informed decision when planning to buy and sell vehicles, as part of planning the household expenditure.

C. **Remuneration for vehicles that would be scrapped in any case** – in Israel, unlike other countries in the world, the scrapping program in the years 2010 to 2013 covered very old vehicles, aged 20 years and over. These vehicles have a short life expectancy anyway, relatively low annual mileage, and are about to be scrapped in any case.

D. **Wrong incentive structure** – the program paid cash to vehicle owners, without motivating vehicle owners to direct the money to buying a new vehicle and thus ensuring the refund of the taxpayers' payments for the program.

In this paper we offer an innovative, budget-balanced, data-based model that allows for a continuous reduction in the age of the Israeli vehicle fleet and reaching the rejuvenation targets in a relatively short time, while creating a clever and balanced incentive system.

The principles of the model:

A. **A voucher in exchange for the scrapping of outdated vehicles** – any person who scraps his vehicle will receive a negotiable voucher in the form of a bearer bond which entitles the holder to a discount, equal to the value of the voucher, on the purchase of a new vehicle. Most people will prefer to buy a used but younger vehicle. In order to allow the remuneration for scrapping their vehicle to be used effectively, the voucher should be negotiable, in the form of a bearer bond, so that the owners of outdated vehicles can sell it to vehicle dealerships that will transfer it to the importer upon the purchase of a new vehicle.

B. **The purchase of vehicles to be scrapped by an external franchisee** – a tender will be held to select franchisees that will collect the scrapped vehicles, deal with them and use them according to the guidelines set out in the tender, provided that the vehicle will no longer be driven on Israeli roads. In return, the franchisee will pay the state 750–1500 NIS (depending on the age of the vehicle) for each vehicle that it handles.

Evaluating the outcome of the model[1]:

- The budget of the program will be about NIS 800 million per year.
- The budget will be financed jointly by the state, the vehicle importers and the private franchisees who will receive the used vehicles (deducting the amount transferred by these private franchisees upon receipt of the vehicles).
- The state's share of the total budget will be just NIS 320 million, and will be financed by the revenues from the new vehicles that will be purchased (no additional budgeting or an increase in the existing expenditure framework are required).
- Within 10 years of the beginning of the implementation of this ongoing model, the median life expectancy of vehicles in Israel will decrease from 15.5 years to 12 years, the share of vehicles over 9 years old will decrease from 36% (under normal business conditions) to 27%, and the share of vehicles aged over 15 years will drop from 10% to just 4%. Furthermore, the economy will enjoy an external benefit of about NIS 10 billion as a result of savings on the expected damages from fatal road accidents and pollutant emissions.
- About NIS 30 billion will be added to the state budget over the first decade of the application of the model, due to an increase in demand for new vehicles, which will result in an increase in revenues from direct taxation, customs and VAT.

In conclusion – the proposed program will allow continuity and certainty for vehicle owners, flexibility for decision-makers to set scrapping targets while maintaining a budgetary balance, and will be effective in significantly reducing the median life expectancy of vehicles in Israel (and as a result significantly reduce the damages from accidents and pollutant emissions).

1 According to a calculation based on the above assumptions, for further detail see Chapter D of this document.

C. Background

1. The need for an effective scrapping program

Vehicles are a product with a significant lifespan. During the last 30 years, despite the technological changes, there has been no significant increase in the rate of scrapping of vehicles. The median age at which vehicles in Israel are deducted from the car parc is 15.5 years, and 20% of vehicles even live on beyond their 20th year. However, in Israel the number of new vehicles increases from year to year and therefore the average age of vehicles is lower (6.7 years), but once a vehicle is on the road, there is a 50% chance that it will continue to be on the road for the next decade and a half.

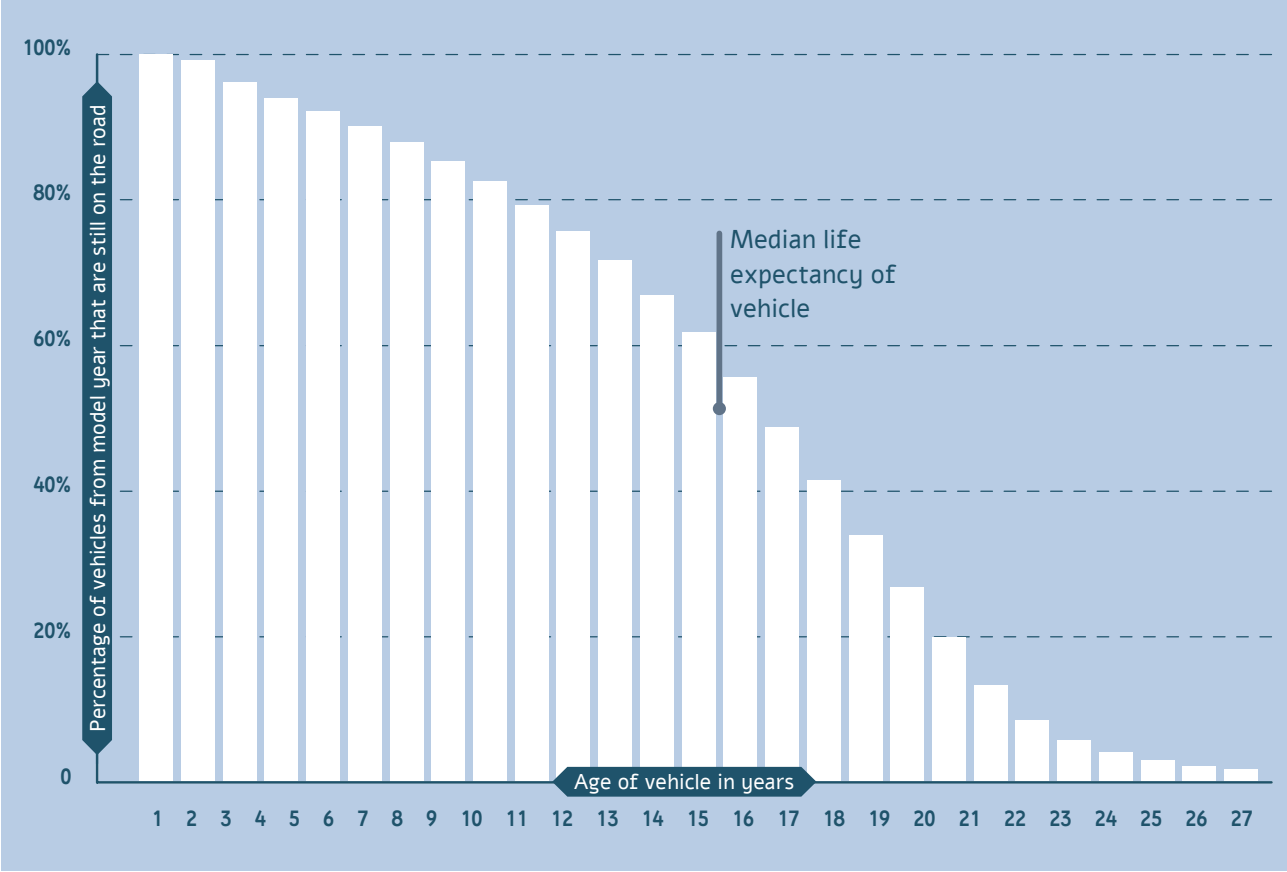


Figure 1: Average survivability rate of vehicles in relation to the age of the vehicle, data for model years 1987-2017 (source: processing of CBS data)

The presence of old vehicles on the road in Israel is a significant hazard from a safety and environmental point of view, and brings about a decrease in current state revenues.

Safety-wise, older vehicles are much less safe than newer vehicles. According to processed CBS data for 2017 (as can be seen in Figure 2), outdated vehicles are involved in accidents over 2.5 times more than new vehicles (per million kilometers traveled). This is due to differences in safety levels and the inferior mechanical condition of outdated vehicles. **These differences are growing, and will continue to grow significantly following the introduction of advanced safety systems in new vehicles in recent years.** To illustrate this, let's look at the safety data of new vehicles in 2014 compared to 2017 (Figure 3).

The Tax Authority rates the vehicles' level of safety system on a scale of 0 to 8, with 0 denoting vehicles which are equipped only with basic safety systems (seat belts) and 8 denoting vehicles with advanced safety systems. In 2014, 87% of the vehicles had a rating of 0 or 1, while in 2017 (just 3 years later), 80% of the vehicles already had a rating of 5 or higher. This difference tells the whole story - new vehicles are significantly safer than older vehicles due to the latest safety systems. According to McKinsey's forecasts, in 2025 the world will be introduced to the first vehicle in which autonomous systems will be installed, which will make it a "zero-accident vehicle". These up-to-date vehicles will create an unprecedented situation in which the vehicle population is divided between vehicles which are dangerous to the public and vehicles which are safe for the public, and the gaps that exist today will widen even further. This will lead to increased pressure to get rid of the older vehicles even if they are of a relatively young age.

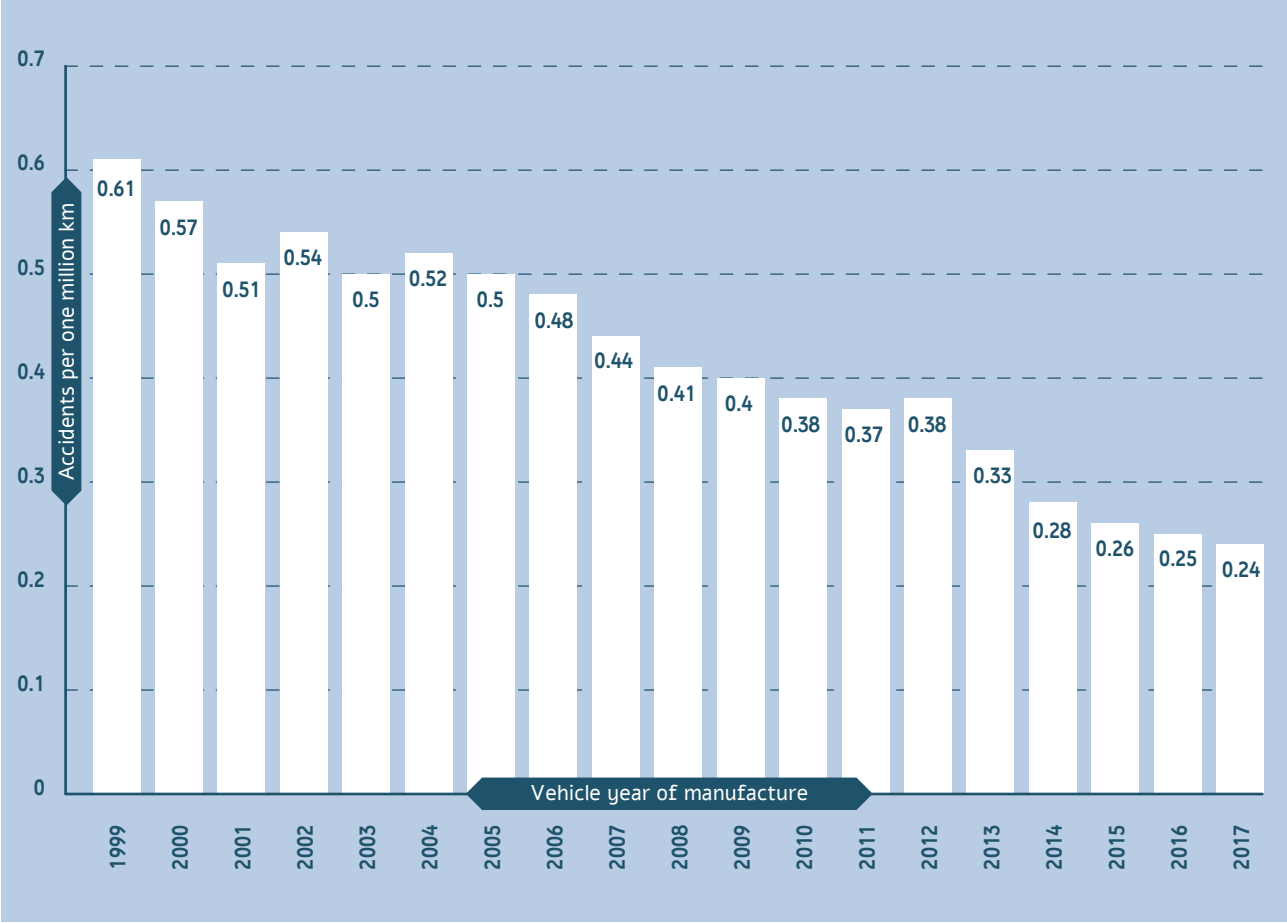


Figure 2: Passenger cars – accidents per 1 million kilometers according to model year, in 2017 (source: processing of CBS data)

A gradual scrapping program led by the government is a must in an environment where such drastic changes in safety are taking place (Figure 3).

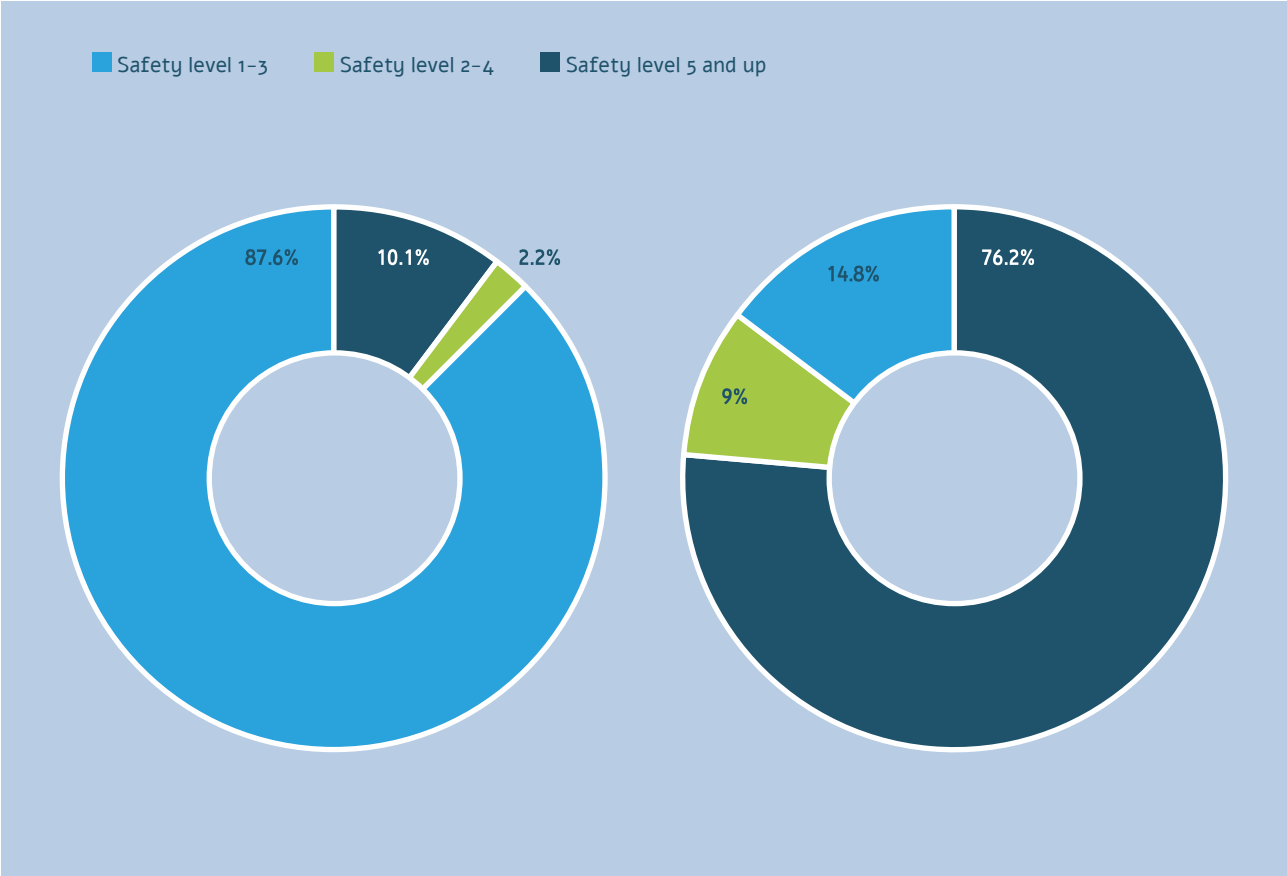
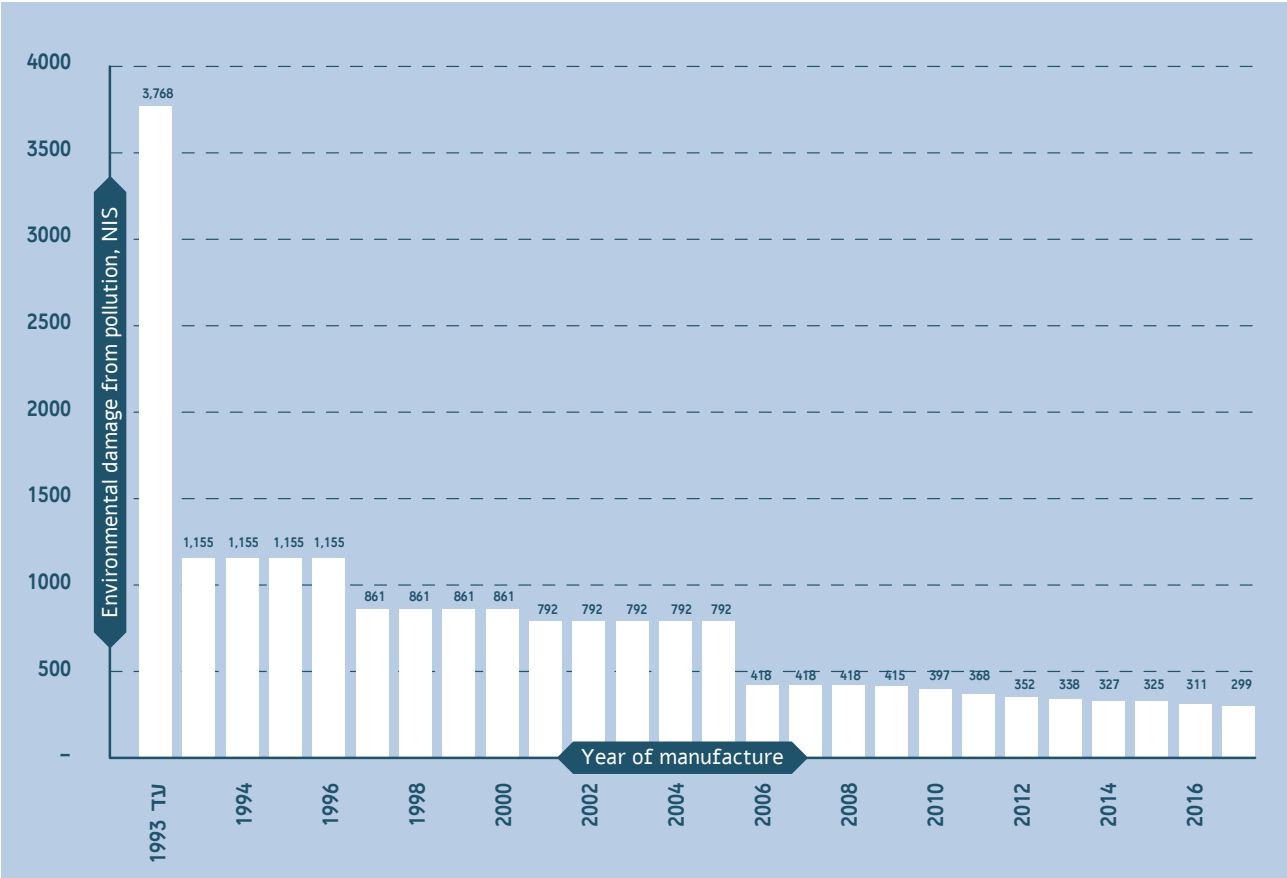


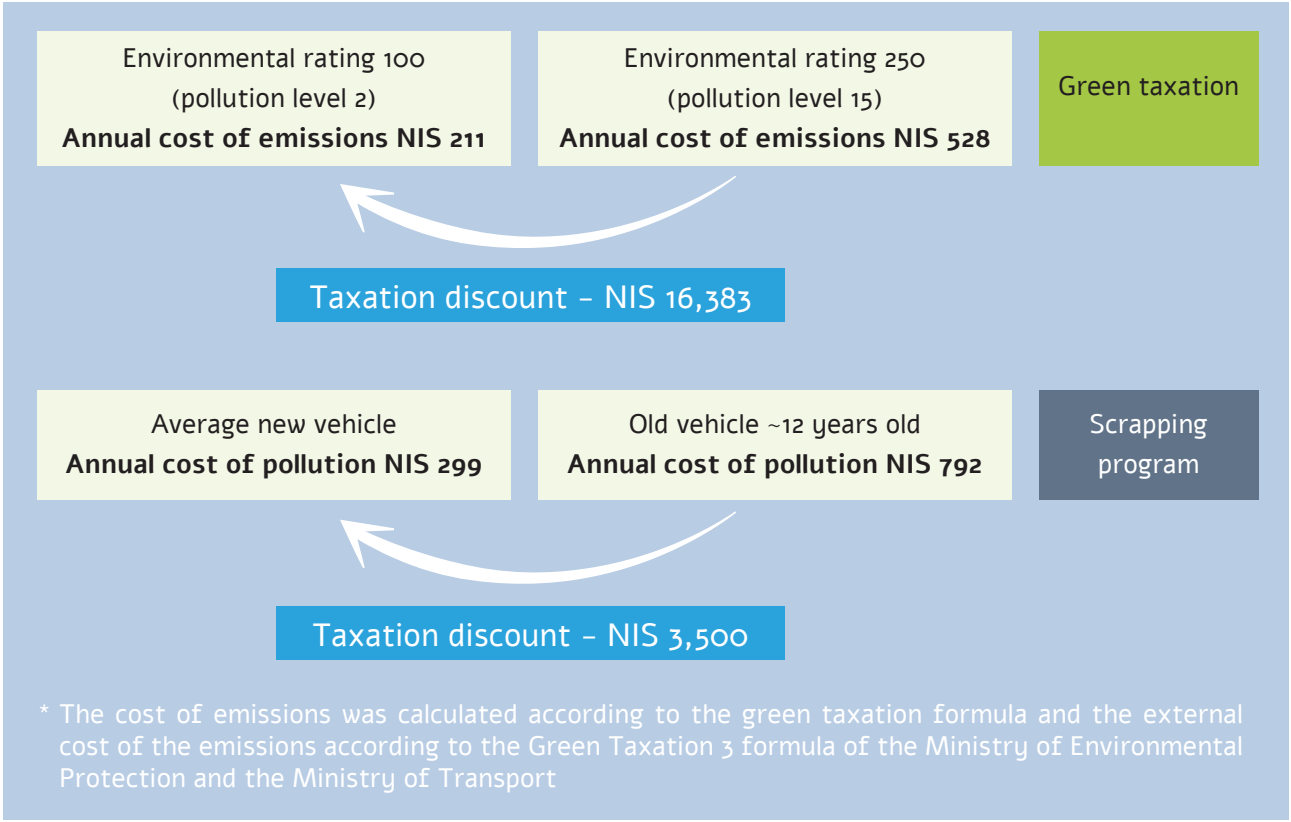
Figure 3: Level of safety equipment in new vehicles. On the right – 2017 data, on the left – 2014 data (source: processing of CBS data)



(תרשים 4: נזק סביבתי שנתי בש"ח מפליטות רכב לפי שנת ייצור (מקור: עיבוד לנתוני למ"ס

Environmentally, vehicles are becoming less polluting every year. Pollution has significant local and global economic consequences, both in terms of preventing health problems and the quality of the air, and in terms of emissions of greenhouse gases and protecting the climate. In the next decade, much cleaner technologies are expected to be introduced, and in addition, Israel's commitment to the group of developed countries under the Paris Agreements and subsequent agreements calls for a significant reduction in pollution levels in the transportation sector. **The scrapping of old and polluting vehicles will contribute to reducing air pollution and meeting the government's emissions targets** (Figure 4).

The program is economically very efficient in environmental terms – for comparison, the green taxation program, which set itself the target of persuading new vehicle buyers to purchase non-polluting vehicles in the first place, uses high tax incentives that can amount to more than NIS 16,000 for a new vehicle, and even more for electric and hybrid vehicles, in order to reduce the purchase of polluting vehicles and thus achieve an annual benefit of about NIS 300 per vehicle in pollution costs, while a scrapping program will require an incentive of about NIS 3,500 in the form of discounts from the state (and a similar amount from the vehicle importers), in order to save NIS 500 a year in pollution costs.



* The cost of emissions was calculated according to the green taxation formula and the external cost of the emissions according to the Green Taxation 3 formula of the Ministry of Environmental Protection and the Ministry of Transport

State revenues – in Israel in the last 30 years there has been an almost perfect correlation between the GDP and the size of the vehicle fleet. **This means that only two factors affect the purchase of new vehicles – the rate of vehicle scrapping and the increase in the GDP.** The scrapping rate in Israel is one of the lowest in the Western world. A median vehicle reaches the age of 15.5 years before being taken off the road. Lowering this age to 12, as is common in most European countries, will dramatically increase the scrapping rate and increase the pressure for rejuvenation by safe and non-polluting vehicles.

Since each new vehicle brings contributes an average of NIS 52,000 to the state coffers, **a scrapping program that will succeed in increasing the number of vehicles scrapped by an average of 60,000 vehicles per year, will generate more than NIS 3 billion additional revenues for the state annually** (Figures 5 and 6), i.e. additional revenues of NIS 30 billion over a decade.

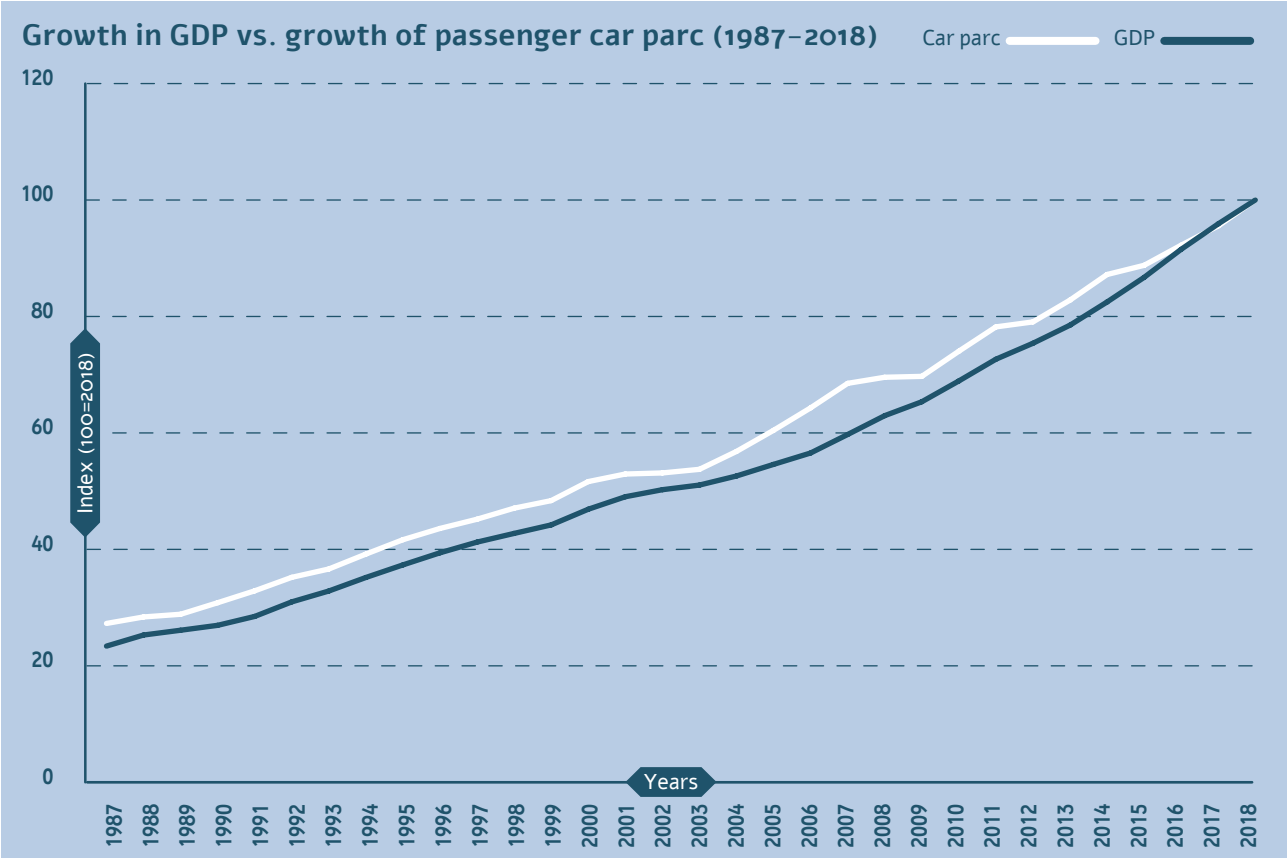


Figure 5: The increase in the car parc in relation to the increase in the GDP (source: processing of CBS data)

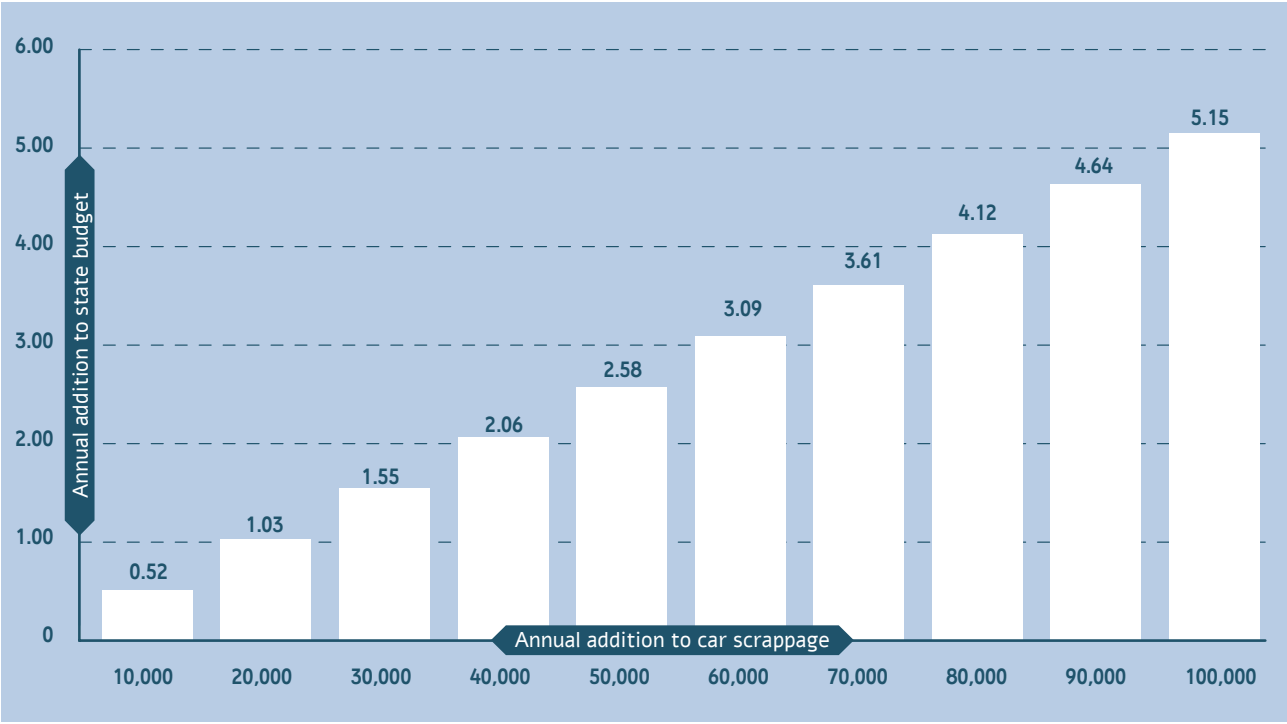


Figure 6: The annual addition to the state budget (in billions of NIS) in relation to the increase in annual vehicle scrapping.

Elements which hinder the natural scrapping process in Israel:

A. **The licensing fee** – Older vehicles tend, according to the statistics, to be more polluting, less safe and technologically inferior, and to burden the state budget due to the consequences of accidents and pollution, which create external costs to economic activity. Despite that, an owner of an old, unsafe and polluting vehicle has no incentive today to take it off the road. In fact, the annual vehicle licensing fee decreases over the years, so the fee for an old vehicle is lower than the that for a new vehicle. This anomaly encourages owners of old vehicles to continue to own these vehicles. The costs of additional tests required from an outdated vehicle, such as an MOT test twice a year (from the age of 15 years) and a brake test (from age 20) amount to a relatively low sum (96 NIS for an additional MOT test and 150 NIS for a brake test) and do not change the economic incentive structure, as can be seen in the graph below (Figure 7).

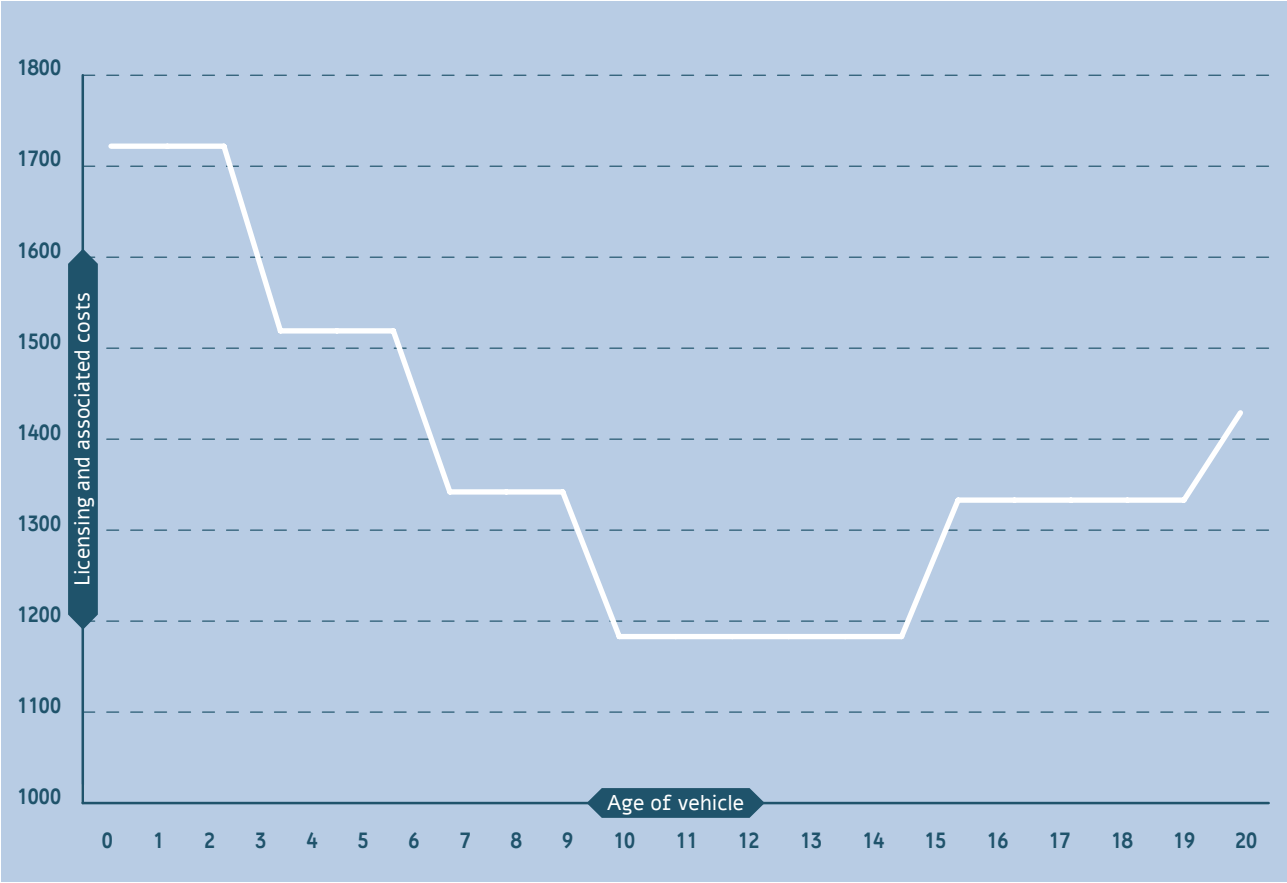


Figure 7: The cost of the annual licensing fee + associated costs as a function of vehicle age.

B. **Vehicle insurance** – It is currently not customary to charge extra insurance payments for an old vehicle. The opposite is true; the owner of an old vehicle will prefer third party insurance plans which reduce the annual payment even further.

C. **Lack of a positive incentive for scrapping** – an owner of an outdated vehicle who wants to get rid of his vehicle cannot currently get any money for the old vehicle unless he sells it for scrap at a very low price.

The outcome of the current policy

While the green taxation policy is an effective policy that has fundamentally changed the composition of new vehicles purchased, causing a shift to less polluting and safer vehicles, there is no parallel policy on the scrapping side. Except for a few scrapping operations for very old vehicles (over 20 years), no active effort is made to get rid of polluting and unsafe old vehicles; the opposite is true. The annual licensing fee for polluting and unsafe outdated vehicles is lower than the fee for new vehicles. In addition, the small number of scrapping campaigns, their random and short-term occurrence, and their focus on extremely old vehicles do not really allow the vehicle owners to plan their scrapping and respond to the incentives intelligently. The result is vehicles which corrode on the road until they are sold as scrap or have an accident.

In 2017, there were about 327,000 vehicles aged 15 years and over on the Israeli roads, and another 777,000 vehicles aged 9-14. The proportion of vehicles aged 9 years and above out of all the vehicles in Israel is 31%. Without the right policies these numbers will almost double. In 2030[2], there are expected to be more than 600,000 vehicles aged 15 and over on Israeli roads, and over 1.2 million vehicles aged 9-14, and their share of the total vehicle fleet will increase to 36%. (Figure 8).

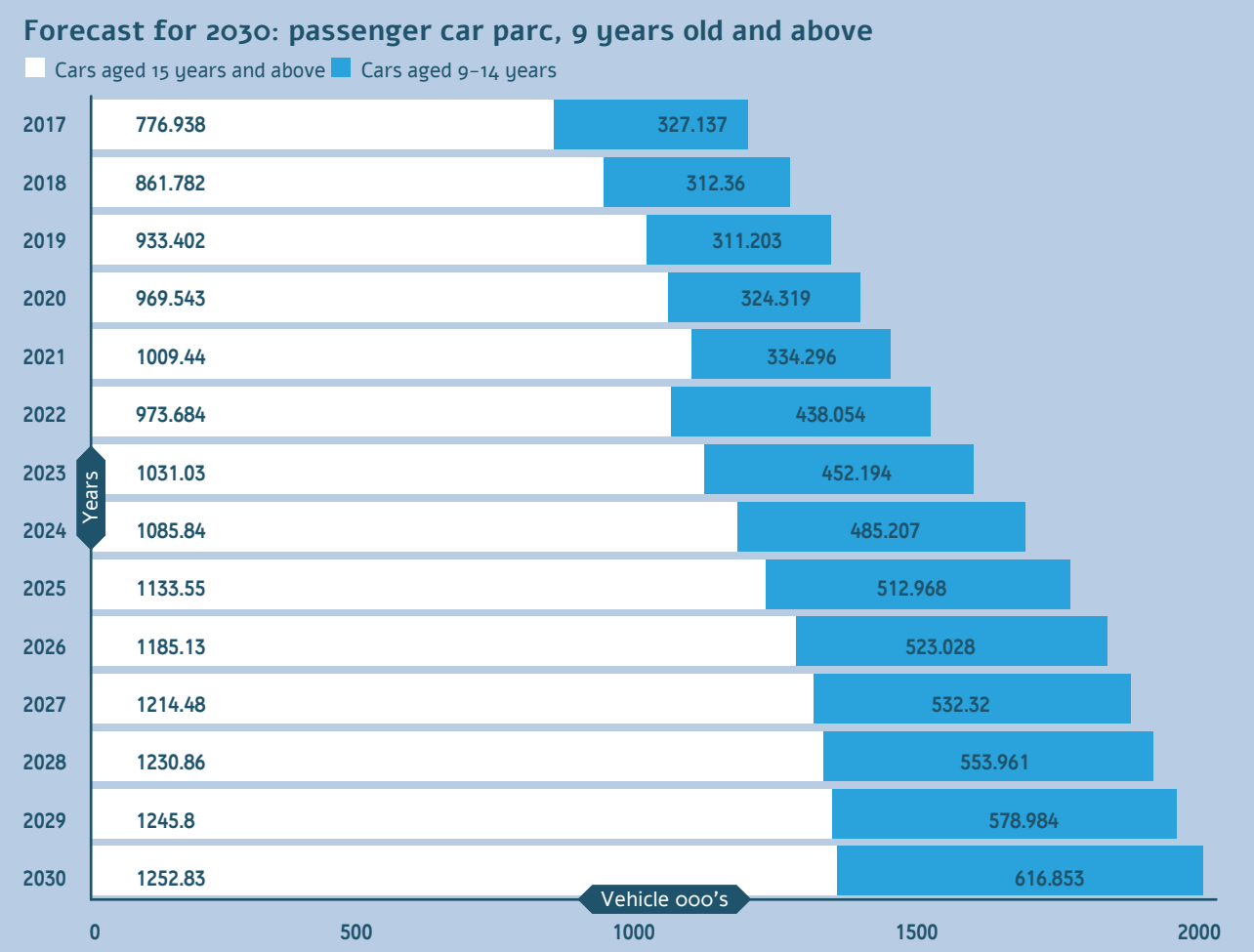


Figure 8: The forecast for the number of old vehicles until 2030

On the other hand, in the next decade, significant developments are expected in vehicle technology and especially in the field of safety. Things that are accepted in the current decade, such as

2 This forecast is based on the rate of aging of the current vehicle fleet.

hundreds of deaths in traffic accidents every year, or soot in the city centers, will be perceived as unbearable already about 10 years from now. It is very likely that the government will be required in the next decade to come up with extensive and expensive programs for scrapping hundreds of thousands of vehicles, including vehicles that are currently perceived as relatively new.

The sooner the state prepares for the new reality and produces a clever, sustained and budget-balanced incentive program, the more will Israel be able to prepare itself properly for the new reality, without requiring huge budgets or a sweeping future disqualification of vehicles from being driven on the road.

2. Guidelines for an effective scrapping program

Traditional scrapping programs in Israel

A program for scrapping old vehicles was studied in Israel in 2003 in a report by the Ministry of Environmental Protection, which examined the economic and environmental viability of this type of move[3]. However, the program was first implemented in Israel in 2010 concurrently with the wave of scrapping programs in OECD countries, and was operated intermittently until 2013, albeit on a much smaller scale than those seen in European countries and the USA. **A total of 28,000 vehicles were scrapped over a period of three years**.

The vehicles that were allowed to participate in the program were those aged 20 and over, with a valid vehicle license (in order to ensure that only vehicles that were still on the road could be included in the program), and provided there was no foreclosure or lien on the vehicles.

For each vehicle handed over for scrapping, the state offered a grant of NIS 2,000, without making it conditional on purchasing a new or second-hand vehicle, unlike the model applied in European and US countries. The program was allocated a budget of NIS 100 million, but only NIS 87 million were utilized, due to concerns regarding the difficulty of scrapping a large amount of vehicles according to proper scrapping procedures. In 2011, the Ministry of Environmental Protection proposed (following an economic study performed for the Ministry by the Pareto group) to allocate an additional NIS 300 million to the scrapping program in order to scrap 40,000 vehicles without a catalytic converter, a move that was expected to lead to environmental benefits of approximately NIS 750 million[4]. However, only NIS 100 million were approved in total over the years 2010-2013, and tens of thousands of vehicles imported before 1994 have remained on the road.

In 2014, the Bank of Israel examined the reenacting of the scrapping program in order to remove from the road the 60,000 vehicles manufactured before 1994, which as of that year had not yet been scrapped[5].

3 Lavie, Becker and Ben Shlomo, "An economic assessment of the feasibility of scrapping vehicles in Israel", submitted to the Ministry of Environmental Protection, 2003.

4 The Pareto Group, "Assessing the expected economic consequences of expanding the program to encourage the scrapping of old vehicles," Submitted to the Ministry of Environmental Protection, 2011.

5 Bank of Israel - research division, "Early scrapping of cars in Israel - Lessons and Recommendations", 2014.

The examination by the Bank of Israel revealed that the environmental and safety benefit from the continuation of the scrapping program will be even higher than that estimated by the Ministry of Environmental Protection three years earlier, since in terms of safety old vehicles are not only more likely to be involved in accidents, but there's an even higher probability of fatalities and serious injuries, at a high cost to the economy. Thus, the return on a scrapping program now includes both a significant reduction in environmental pollution and a significant increase in road safety, which becomes more and more significant with the introduction of modern autonomous and semi-autonomous technologies, which also lower the likelihood of an accident.

In conclusion, despite three comprehensive studies on this subject performed by government entities or at their initiative, and despite the fact that all of them have conclusively demonstrated that a national vehicle scrapping program is economically, environmentally and socially profitable for the country, the vehicle scrapping program has not been reenacted until the time this document was written.

Why do traditional scrapping programs in Israel fail?

We believe that the traditional scrapping programs have so far failed, despite their theoretical economic viability, for a number of reasons:

A. **Budget** – Traditional programs are expensive and place a burden on the state budget. A vehicle scrapping program costs tens, even hundreds of millions of NIS. This is a considerable expense for the state treasury, and despite its economic viability, budget constraints and current needs in the areas of health, education and security relegate the program to the bottom of the national order of priorities.

B. **Lack of consistency** – Traditional programs are one-time and unanticipated campaigns, so vehicle owners cannot plan ahead and cannot make an informed decision when planning to buy and sell vehicles, within the planning of household expenditures.

C. **Compensation for vehicles that would be scrapped in any case** – the programs target an irrelevant vehicle population. In Israel (unlike other countries in the world) the program is aimed at very old vehicles, aged 20 years and over. These vehicles have a short life expectancy anyway, a relatively low annual mileage, and are about to be scrapped in any case.

The following graph shows that old vehicles are taken off the road almost always due to obsolescence. In contrast, younger vehicles are scrapped far less for reasons of obsolescence (although many of them are no longer safe, and polluting). Thus, compensation for the owners of vehicles aged 20 and over is ineffective because it only slightly precedes the scrapping that would have taken place in any case. However, outdated vehicles aged 9-14 are not included in the programs, despite the fact that there are people who own vehicles of that age, who are aware of the safety, reliability and pollution problems of their vehicle and would gladly get rid of them for an adequate compensation (Figure 9).

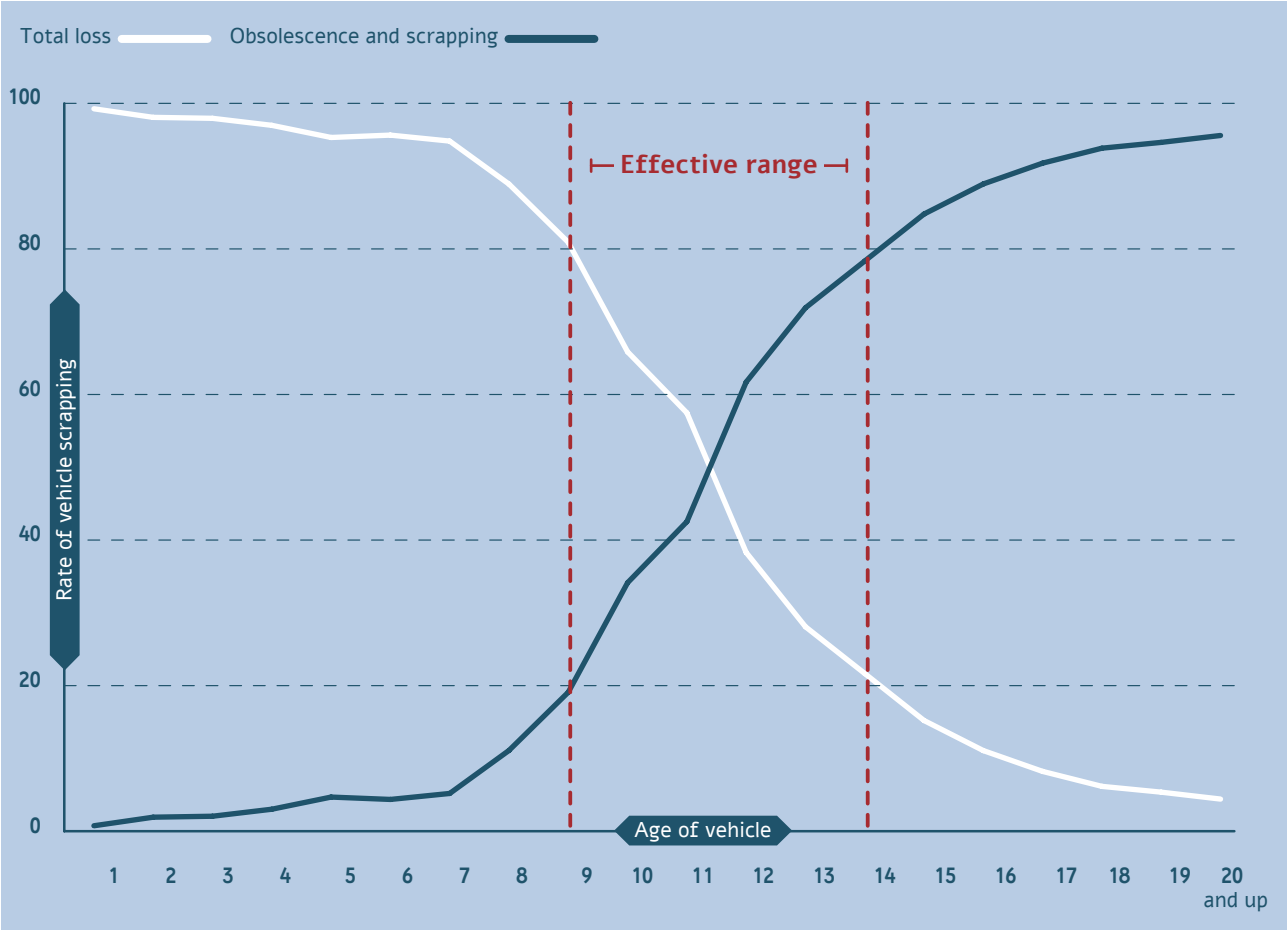


Figure 9: The share of scrapping out of the total cancellations of vehicle licenses according to the vehicle's age and the reason for the cancellation (processing of 2018 CBS data).

D. Wrong incentive structure

- Past programs gave cash money to vehicle owners – this did not constitute an incentive for vehicle owners to allocate the money to purchasing a new vehicle, thus ensuring the reimbursement of the funding of the program by the taxpayer.
- The programs did not create an incentive for scrapping for those who refuse to take their old vehicle off the road.

Principles for setting up an appropriate scrapping program

The program:

A. **Will finance itself on an ongoing basis in cooperation with the state, the importers and franchisees who will receive the used vehicles for export/recycling.**

B. **Will create fixed and ongoing conditions on the basis of which the owners of outdated vehicles will be able to make long-term rational decisions.**

C. **Will create a positive incentive for vehicle owners who choose to get rid of old vehicles.**

D. **Will direct most of its incentives to vehicles aged 9-14, in order to significantly reduce the age of vehicles in Israel.**

D. The proposed program

As aforesaid, a one-time scrapping model is expensive in budgetary terms, cannot be maintained over time and worst of all – it rewards the scrapping of vehicles that would have been scrapped anyway (vehicles aged 20 and over). This is why these models are rarely applied in Israel and elsewhere, and do not endure.

In this study, we will propose an innovative model, funded jointly by the state and the importers, based on data, which allows for a continuous lowering of the age of the Israeli vehicle fleet and reaching the rejuvenation targets in a relatively short time while creating a clever and balanced incentive system.

The principles of the model:

A. Applying the model to the effective scrapping range.

B. Joint financing by the vehicle importers, the franchisees (who will take the vehicles off the road) and the state.

C. A graduated compensation model that encourages scrapping.

D. Creating a mechanism for removal of vehicles from Israeli roads.

Details of the proposed model:

- The owners of vehicle aged 9-14 who choose to scrap their vehicle will be entitled to receive, in exchange for their vehicle, a discount voucher for the purchase of a new vehicle. (It will be possible to use one voucher for the purchase of one new vehicle). The scrapped vehicles will be required to reach the scrapping franchisee under their own power and have a valid vehicle license. The voucher will be for a sum of NIS 11,500 for a 9-year-old vehicle, decreasing gradually every year. The voucher will be negotiable so that it can be transferred to a used vehicle dealer (who can then use it for the purchase of another used vehicle). In this way the voucher will pass from hand to hand until it is used for the purchase a new vehicle from an importer.
- A tender will be held to select a franchisee that will collect the vehicles to be scrapped and deal with them, provided that the vehicles shall not return to the road. In return, the franchisee will pay the state a fixed amount for each vehicle that passes into its hands.

The advantages of the program:

A. **A program which is self-financing** – the program will amount to about NIS 800 million per year and will be financed by part of the tax increase that will be created for the state by vehicle importers, and from the payment of the vehicle collection franchisee for each vehicle that is scrapped (an income of NIS 750-1,500 per vehicle). T**here will be no need for an additional budget, as the financing will only be at the time of actual purchase of a new vehicle in place of the old vehicle, and will be at the expense of the state's revenues, the importers and the collection franchisee and not part of the of the expenditure side.**

B. **Continuity** – The program will be implemented continuously over years. This will allow certainty for vehicle owners and will allow households to plan and prepare for the scrapping of their vehicles.

C. **Flexibility** – The program will set scrapping targets for vehicles based on model year. If the goals are not achieved, the amount of funding and the amount of the vouchers can be changed throughout the program's lifespan.

D. **Effectiveness** – The program will reduce the median vehicle age in Israel significantly and relatively quickly.

We shall demonstrate the results of the implementation of the program over the next decade by using the model together with a number of basic assumptions:

- The program will take 30,000 9-14 year old vehicles off the road each year, over and above those currently being scrapped naturally.
- With older vehicles (15 years and above) the rate of scrapping of vehicles will increase by 10% beyond the natural scrapping rate
- For each vehicle scrapped there will be an income of NIS 750 – 1,500 from the scrapping franchisee
- There will be in addition operating costs, amounting to 4% of the turnover.

The result of implementing the model subject to the above assumptions:

- The scope of the program will be approximately NIS 800 million per year, and it will be budget-balanced (NIS 330 million from the vehicle importers, NIS 320 million from the state and NIS 140 million from the scrapping franchisee).
- Most of the vehicles will be in the age range that scrapping programs in Israel don't usually "touch", i.e. 9-14 years old, and this will prevent vehicles from reaching more advanced ages, over time and continuously.
- Over the course of 10 years, the program will succeed in lowering the median age of vehicles from 15.5 to 12 years. The percentage of vehicles aged 9 and over on the road will decrease from 36% to 27%. Of these, the percentage of vehicles over the age of 15 will decrease from 10% to just 4%.
- The program will reduce the number of fatalities from traffic accidents by many hundreds over the next 15 years (the economic model predicts that roughly more than 630 fatalities will be saved). As a result of the program, the state tax revenues will increase by NIS 30 billion over the next decade.

Calculating the value of the voucher:

The voucher is negotiable.

The voucher will be attractive mainly for vehicles that age relatively quickly. In the higher ages there is a very large variance between the vehicles. The differences stem from the mileage, the service history, the accidents and breakdowns history, the driving style over the years, the types of vehicles, etc.

Thus, when calculating the value of the voucher, it is clear that we are not targeting all vehicles but only specific models that tend to become obsolete, including those whose owners know that it will be very difficult for them to sell at the list price (due to minor accidents, various mechanical problems or difficult market conditions). In this respect, the process performs the natural selection by removing the weakest, most polluting and unsafe vehicles moving on the country's roads.

The calculation of the value of the voucher – the voucher is calculated based on the prices of 15% of the cheapest models.

Age of vehicle	Weighted average list price of 15% of the cheapest models	Average value of voucher	Percentage of list price
9	15,968	11,500	72%
10	13,871	10,500	76%
11	12,159	9,000	74%
12	10,900	8,000	73%
13	9,591	7,000	73%
14	6,075	5,600	92%
15+	3,019-4,993	3,750	75%-124%

Table 1: The value of the voucher vis-à-vis the list price of 15% of the cheapest models of each age.

When examining the values of the vouchers offered against a wider model sample (40% of the cheapest models), the voucher constitutes 55-70% of the list price of those vehicles. Thus, it is not inconceivable that more expensive models will also join the scrapping program, due to a problematic market situation or vehicles with more serious problems.

Age of vehicle	Weighted average list price of 40% of the cheapest models	Average value of voucher	Percentage of list price
9	21,027	11,500	55%
10	18,265	10,500	57%
11	16,011	9,000	56%
12	14,354	8,000	56%
13	12,630	7,000	55%
14	8,000	5,600	70%
15+	3,975-6,496	3,750	57%-94%

Table 2: The value of the voucher vis-à-vis the list price of 40% of the cheapest models of each age.

The budget of the proposed program:

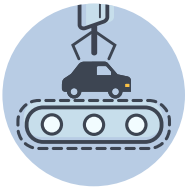
The income will be made up of three components:

The state

Allocation of approximately NIS 320 million per year from the income from vehicle taxation in order to finance the vouchers (it should be stressed that no additional budget is required for the implementation of the program).

The vehicle importers

An allocation of approximately NIS 330 million by providing a subsidy of NIS 3,000 per voucher.



The scrapping franchisee

Will pay the state NIS 750 – 1,500 for each vehicle scrapped.

	Annual budget
Thousands of vehicles	
Estimated response – Thousands of vouchers for vehicles aged 9-14 years (including vehicles which would have been naturally scrapped)	72.7
Estimated response – Thousands of vouchers for vehicles aged 15 years and up (half of the amount naturally scrapped per year)	44.9
Costs (in NIS millions)	
Vouchers for vehicles 9-14 years	625
Vouchers for vehicles 15 years and up	135
Operating costs	30
Income (in NIS millions)	
Income from importers	321
Income from franchisee	143
State participation	326

Table 3: Scrapping project annual budget in NIS millions

E. International comparison

Vehicle Scrapping – guiding policy in OECD countries

Vehicle scrapping programs gained momentum in 2009-2010 and have been implemented to varying degrees in dozens of countries, including the United States, Canada, the United Kingdom, Germany, France, Italy, Spain, and even Russia, China and Japan.

In 2011, the OECD International Transport Forum conducted a study examining the effects of rejuvenating vehicle fleets through scrapping in the United States, France and Germany (OECD 2011). The study addressed the social and environmental benefits of the programs in reducing pollutant emissions, increasing fuel efficiency and improving road safety. Its main conclusion was that in order to produce a scrapping program with high environmental and social benefits, **care must be taken to incentivize the scrapping old vehicles that were in regular use (as opposed to old vehicles that were not widely used)**. Thus, apart from the age criterion, there are other criteria which should be considered, which examine how polluting / safe the vehicles are. In doing so, a good criterion of pollution level is fuel efficiency, i.e. km per liter, and a criterion for safety is the presence or non-presence of state-of-the-art safety technologies. At the same time, incentives should be offered for the purchase of new vehicles, which would replace vehicles which are scrapped. The new vehicles are smaller, have lower NOx and CO_2 emissions (not diesel vehicles) and employ state-of-the-art safety technologies.

It should be noted that making the purchase of a new vehicle a stipulation for scrapping does not make the program accessible to the owners of the oldest and most harmful vehicles, who, even with the subsidy offered by a voucher, are not able to purchase a new vehicle. One way to deal with this, according to the authors of the study, is to allow the use of vouchers also to purchase used vehicles that meet the required criteria. The following pages outline four scrapping programs conducted in 2009-2010 in the United States, Germany, France, and the United Kingdom. It should be noted that the model applied in these countries is representative of the models of the programs implemented in the other developed countries which were examined, and is based on one principle: providing a grant or a voucher in exchange for handing over an old vehicle for scrapping and purchasing a new one in its place, with the realization of the grant/voucher being subject to the purchase of a new or used vehicle that meets defined criteria. Another feature common to all the programs is the high demand by consumers to participate in the program, which in most cases resulted in a faster than expected utilization of the budget allocated to it; this led to increasing of the budget "on the move" (in most cases) and extending the program for a further period.

The United States (Office of Public affairs 2009)

The CARS (Car Allowance Rebate System), known as "Cash for Clunkers", was launched in July 2009 as a means of improving the composition of the passenger car and light truck fleet in the United States to include more fuel-efficient, less polluting and safer vehicles, while aiding the American automakers and the entire national economy following the crisis of 2008-2009. The total budget allocated to the program by the US Congress was $ 3 billion, for a limited period of four months up to November 2009, but the project was terminated due to exhausting the budget completely by the end of August. The cost to the administration for each replacement of an old vehicle for a new one was $ 3,500 - $ 4,500, and the total number of vehicles sent to be scrapped and replaced by new vehicles was slightly less than 700,000.

The program covered vehicles that met the following criteria: vehicles up to 25 years old, which were replaced by purchasing a new vehicle or leasing one for a minimum of 5 years. The vehicles handed over for scrapping were required to have a fuel consumption of up to 18 miles per gallon, had to be licensed and covered by insurance during the previous year and in a usable condition. The new vehicle was required to have a value of no more than $ 45,000 and a fuel consumption of at least 22 miles per gallon (9.2 km per liter). In exchange for the vehicle handed over for scrapping the owner received a voucher for $ 3,500 - $ 4,500 according to the fuel consumption of the used vehicle, which could be realized when purchasing or leasing the new vehicle.

In order to make sure that the vehicle dealerships did not resell the vehicles intended for scrapping, a procedure was introduced to replace the engine oil with a sodium silicate solution, which also prevents the use of the engine parts as spare parts. In addition, according to the project's procedures, the vehicle had to be crushed within 180 days of delivery for scrapping. In terms of the main criterion which was studied in the CARS project, the project was regarded as a success, since the fuel consumption improved by an average of 61% over that of the replaced vehicles. However, there was criticism regarding a variety of issues which were not taken into account, such as pollution caused by the production of new vehicles, or the change in the drivers' behavior, as their mileage would increase due to their driving vehicles with a better fuel consumption, thus reducing the environmental impact of the program. As aforesaid, the OECD study, which thoroughly examined the environmental and social impacts of the CARS project, found it to be highly effective.

Germany (ACEA 2009; OECD 2011)

The German Umweltprämie program was launched in January 2009, was initially scheduled to last until May of that year and was extended until the end of 2009, with a total budget of 5 billion Euros. This is the largest vehicle scrapping project ever undertaken, in terms of the budget allocated to it and the number of vehicles taken off the road, around 3.6% of all passenger vehicles in Germany. The program was intended for the replacement of vehicles over 9 years old with new vehicles or used vehicles up to one year old, which complied with the Euro 4 pollutant emission

regulations. In exchange for handing over an old vehicle for scrapping, the consumer received a refund of € 2,500 after purchasing a new vehicle or a used vehicle up to one year old.

	2010	2020	2030
US Cars			
Light	1157	3	-3
Medium	-1081	31	3
Heavy	-76	0	0
German Umweltpramie			
Light	-636	-55	0
Medium	634	55	0
Heavy	2	0	0
French Prime a la Casse			
Light	68	4	0
Medium	-65	-5	0
Heavy	-3	0	0

Table 4: The effect of scrapping programs on vehicle mileage by vehicle category in the US, Germany and France.

As can be seen, while in the US and France there was a decrease in the mileage of heavy and medium vehicles and an increase in the mileage of light vehicles, in Germany the situation is reversed, reflecting the failure to set criteria for participation in the scrapping program (OECD, 2011).

The results of the project were very positive for the German automotive manufacturers, who saw a 40% increase in vehicle sales over the previous year. However, since the criteria in the German project were more permissive, in about 70,000 cases 'light' vehicles were replaced by heavier vehicles, as many of the new vehicles in Germany, including medium-sized vehicles, comply with the Euro 4 regulations. This meant a failure to change the mix of the German vehicle fleet so that it included lighter vehicles, unlike the success in this area in the US and France. Another side effect that the planners had not intended is that at least 50,000 vehicles that were handed over for scrapping were actually sold by vehicle dealerships to countries in Africa and Eastern Europe. **This shows that a scrapping program must maintain alongside it green taxation of new vehicles in order to ensure that the scrapped vehicles are replaced by non-polluting vehicles**.

France (ACEA 2009; OECD 2011)

The French 'Prime à la Casse' program to remove polluting passenger and commercial vehicles from the road was also launched in January 2009. The vehicles that met the criteria for handing over in exchange for a refund were passenger or commercial vehicles up to 3.5 tons aged over 10 years, which emitted more than 160 grams per km of CO_2 emissions. In return for handing over the old vehicle and purchasing a new vehicle, the consumer received a refund of € 1,000, with the new vehicle purchased being required to emit less than 160 grams of CO_2 per kilometer. The amount refunded increased for vehicles with lower pollutant emissions (with a maximum of € 5,000 for the purchase of a vehicle emitting less than 60 grams per kilometer – effectively, electric or hybrid vehicles). The total government expenditure on the project was 600 million Euros.

The results of the program were positive with a decrease in the mileage of heavy and medium vehicles and an increase in the mileage of light vehicles. However, many of the new vehicles that replaced the scrapped vehicles were diesel vehicles with high NOx emissions, which prevented a significant improvement in this area following the program, along with the low threshold of 10 years and above which was not sufficient to reach the particularly polluting vehicles.

In terms of improving road safety it should be noted that the three 2009 programs in the US, Germany and France resulted in a decrease in injuries and even deaths as a result of traffic accidents.

In 2015, the French government launched a new scrapping program for diesel vehicles that were registered before 2006. In 2018, a scrapping program for diesel and petrol vehicles was launched (using the voucher method) for the purchase of a new or used vehicle, as can be seen in Table 5. The new French scrapping program includes a differential voucher for scrapping diesel or petrol vehicles, according to criteria of emission level, diesel/petrol, purchase of a new/used vehicle and a new criterion of the vehicle owner's income and distance from his place of work (commute).

C02 (g/km)	Consumer income condition	Age/Energy of the old vehicle to be scrapped	Amount of the scrapping scheme according to the replacement vehicle to be bought (€)			
			2018		2019	
		2018/2019	Second hand vehicle	New vehicle	Second hand vehicle	New vehicle
0-20	Non-taxable	Diesel before 01/01/2006 Petrol before 01/01/1997	2000	2500	2500	2500
	Non-taxable with a commuting distance >30km		N/A	N/A	5000	5000
	Taxable	Diesel before 01/01/2001 Petrol before 01/01/1997	1000	2500	1000	2500
21-50 for PHEV with average autonomy of 40km WLTP or 50km NEDC	Non-taxable	Diesel before 01/01/2006 Petrol before 01/01/1997	2000	2000	2500	2500
	Non-taxable with a commuting distance >30km		N/A	N/A	5000	5000
	Taxable	Diesel before 01/01/2001 Petrol before 01/01/1997	1000	1000	1000	2500
21-122	Non-taxable	Diesel before 01/01/2006 Petrol before 01/01/1997	2000	2000	2000	2000
	Non-taxable with a commuting distance>30km		N/A	N/A	4000	4000
	Taxable	Diesel before 01/01/2001 Petrol before 01/01/1997	1000	1000	1000	1000

Table 5: Criteria for a differential voucher for the purchase of a new/used vehicle in exchange for scrapping an old vehicle, according to the pollution level, diesel/petrol, the vehicle owner's income and the distance of from his place of work (source: ACEA 2019).

United Kingdom (European commission 2010)

The UK Vehicle scrappage scheme began in early 2009 and was extended until March 2010. Upon its completion, the program was replaced by a program to encourage the transition to electric vehicles, which came into effect in 2011. The budget for the program was £300 million for scrapping 300,000 vehicles (later on an additional £100 million was allocated), with a £1,000 grant for each vehicle handed in for scrapping. The vehicle manufacturers committed to match the state grant.

The vehicles that could participate in the program were vehicles 10 years and older, which had been owned by their owners for more than 12 months. As a result of the program, sales of new vehicles increased by 26% compared to the previous year and there was a reduction of 5.4% in the emission of harmful gases by the new vehicles compared to the vehicles handed in for scrapping.

F. Summary

In view of the technological innovations introduced in recent years to the vehicle market in the area of safety, and in light of the entry of electric vehicles into the market in the coming decades, it is worthwhile to implement a multi-year and long-term national program to remove polluting and unsafe vehicles from Israeli roads.

This type of program is economically viable due to its significant economic benefits resulting from lowering the level of air pollution and increasing the level of road safety. In addition, the program is structured so that even on an ongoing basis it won't place a financial burden on the state budget, since the program is self-financing.

Beyond its environmental and safety benefits, which are reflected in short- and long-term economic benefits, another benefit of the program is an increase in state revenues from direct taxes, customs duty and VAT.

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G. Appendices

Appendix 1: The economic benefit of a scrapping program – details

1.1) Savings on costs resulting from environmental pollution

Motor vehicles emit harmful gases that cause adverse health effects and contribute to the greenhouse effect and global warming. Newer vehicles have fewer emissions due to three main reasons – first, the newer vehicles are in better mechanical condition and therefore the systems operate more efficiently and emit less pollutants. The second reason is that most new vehicles include, as original equipment, technologies that contribute to the reduction of pollution, that do not exist in old vehicles. The third reason is that since the application of the green taxation regulations, there has been a tendency for consumers to purchase vehicles that pollute less, for economic reasons.

Pollutant emissions cause two types of proven economic damage:

Economic-environmental damage – The emission of pollutants, especially carbon dioxide, into the atmosphere contributes to the greenhouse effect that leads to global warming. Global warming leads to rising sea levels and the deterioration of the Earth's climate. This situation has far-reaching economic consequences for the entire world and the Israeli economy as part of it.

Health damage – Emissions of polluting chemicals, especially in city centers, increase adverse health effects. It is estimated that about 2,000 people die each year from damages related to air pollution, in which transportation emissions play a significant role. This damage has significant economic consequences such as treatment of illness, sick days, compensation for families, etc.

Methodology for calculating the benefit of scrapping polluting vehicles:

There is an accepted methodology for calculating the external costs of air pollution emitted from polluting vehicles. The methodology involves estimating the difference in emissions between new and old vehicles and multiplying it by the external cost of the excess emissions. To find the emissions data of passenger vehicles we used two sources – for vehicles up to 2009, we used the Ministry of Environmental Protection's calculator for calculating the emissions of vehicle fleets[6], and from 2009 on the emissions data were taken from the Tax Authority's survey of the vehicle market, 2017[7]. In order to calculate the economic damage, we multiplied the damage caused by these emissions by the economic damage used normally for emissions calculations, as it appears in the Green Taxation Report no. 3 published by the government in 2015. These data provide the difference in the external cost of emissions between vehicles from old model years and vehicles from new model years.

6 http://www.sviva.gov.il/subjectsEnv/SvivaAir/CarPollution/Types/Pages/default.aspx

7 https://taxes.gov.il/about/periodicreports/documents/skitrarehev/rechev2017_acc.pdf

The results of the calculation can be seen in Figure 4 in Chapter C. It can be seen that replacing an outdated vehicle with a newer vehicle results in a benefit of hundreds and even thousands of NIS per year (depending on the age of the replaced vehicle and the level of pollution of the vehicle replacing it.). Over the next decade, along with the shift to electric vehicles, the environmental benefit of scrapping vehicles will increase even more, since these vehicles have no direct emissions (although indirectly there are of course emissions at the power plant that produces the electricity).

1.2) Savings on costs resulting from poor safety

New vehicles are much less involved in road accidents with casualties. According to CBS data for 2016, the rate of the involvement in accidents of vehicles up to 3 years old in 2016 was about 30% lower than the rate of involvement in accidents of vehicles aged 13 years and over[8]. It should be noted that this data is correct for 2016 and relates to vehicles produced in 2014-2016, most of which did not yet include the latest safety systems (see below). It can therefore be expected that more recent data, when published, will indicate a deepening of this trend even beyond the 30% decrease in traffic accidents.

This data is intensified when taking into account that the average annual mileage of a new passenger vehicle is a significant 31% higher than that of an old vehicle, **so that the probability of an old vehicle being involved in an accident per each kilometer traveled is 53% higher than that of a new vehicle**. This means that the probability of a new passenger vehicle being involved in an accident is half that of an old model passenger vehicle. Beyond that, new vehicles are also less involved in fatal accidents. The rate of fatal accidents out of the total number of accidents in new vehicles is 25% lower than the rate of fatal accidents out of the total number of accidents among older vehicles (more than 13 years old). If you are unfortunate enough to be involved in an accident - it is much safer to do so in a new vehicle.

Thus, replacing old vehicles with new ones has the potential to reduce the level of traffic accidents in Israel by up to 30% in total and by up to 53% per kilometer traveled (Figure 10 and Figure 11).

8 CBS data, 2016

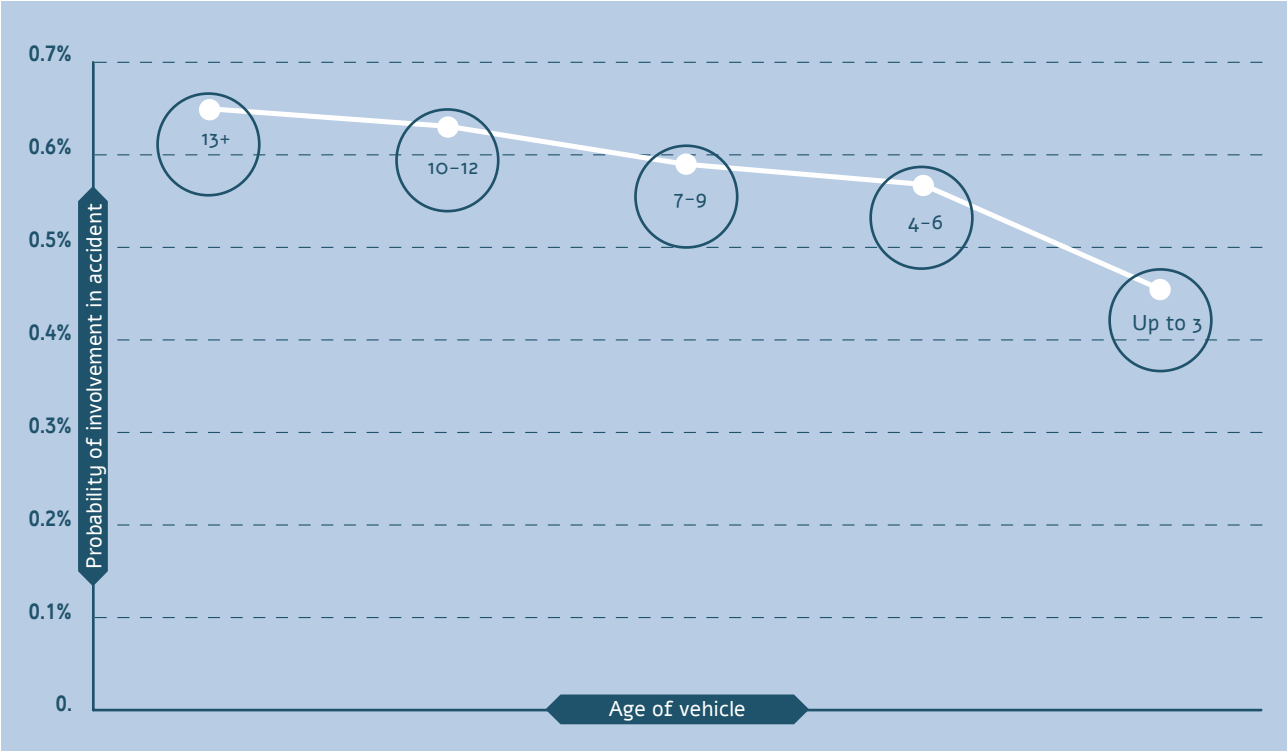

Figure 10: The probability of a vehicle being involved in a traffic accident as a function of vehicle age

Figure 11: Annual vehicle mileage in thousands of kilometers as a function of vehicle age (2016 data)

New safety systems and their effect on the safety level

As of August 1, 2013, a new component has been added to the method of determining the purchase tax imposed on vehicle imports to Israel – incentives for advanced driver assist safety systems. As part of the reform, a list of advanced safety systems that are eligible for tax incentives was drawn up.

Safety equipment rating	Passenger vehicles					
	2012	2013	2014	2015	2016	2017
0	11.8%	10.2%	7.0%	8.0%	7.5%	7.1%
1	87.5%	88.6%	80.6%	63.2%	30.5%	7.7.%
2	0.4%	0.6%	0.5%	2.4%	3.8%	0.9%
3	0.2%	0.3%	1.4%	1.8%	2.0%	5.2%
4	0.1%	0.2%	0.3%	1.8%	3.7%	2.9%
5	0.0%	0.1%	8.4%	14.8%	5.9%	33.8%
6	0.0%	0.1%	1.6%	7.8%	45.6%	37.1%
7		0.0%	0.1%	0.3%	0.9%	5.1%
8				0.0%	0.0%	0.2%
Total %	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total qty.	196,302	204,296	233,868	247,372	275,379	275,163

Table 6: Distribution of imported vehicles (passenger cars) according to the safety equipment rating. Source: data from the Ministry of Transport, processing by the Planning and Economics Division of the Tax Authority

When providing the incentives, emphasis was placed on systems that can prevent an accident, in contrast to systems that minimize the damage from an accident that has taken place, such as air bags. Accident prevention systems are divided into passive systems (systems that provide a warning of danger and the driver himself has to take action), and active systems (systems that not only provide a warning but can also get involved in the driving and the operation of the vehicle. In most cases, **active systems can only be installed as original equipment in the manufacturer's factory**. In the beginning of the reform, active protection systems were installed only in a minority of vehicles, especially luxury vehicles. Today, these systems are installed in a variety of vehicles, including vehicles whose prices are more affordable. However, active systems cannot be retrofitted to older vehicles. Today, tax incentives are only given to active systems, so that we can expect to see more and more systems of this type in new vehicles. The change in recent years has been dramatic, as can be seen in Table 1 above. If in 2013 98.8% of the vehicles had a minimum level of safety equipment (rating 1 and below), in 2017 more than 76% of all imported vehicles had a safety rating of 5 or higher. This means that in the future we will see fewer fatal road accidents involving modern vehicles. It is also likely that the future technologies of the next decade will lead to a dramatic decrease in the number of accidents and injuries in new vehicles.

Calculation of external safety costs

In order to calculate the economic value of scrapping old vehicles and replacing them by new vehicles, we shall use two sets of data – first, CBS data (Table 3.7 in the Transportation Statistical Abstract) regarding the distribution of traffic accidents in 2016 by year of vehicle manufacture. The data shows that an older vehicle has a higher probability of being involved in an accident, and there is also a higher probability that the accident will be fatal. Second, the cost of the accidents according to the level of severity will be taken from the Procedure for Examining Transportation projects (PET). This procedure is an official procedure of the Ministry of Transport which quantifies the external costs related to traffic accident casualties. The procedure takes into account the total health costs, property damage, loss of working days, insurance for bereaved families and the mental distress caused to traffic accident casualties. Since we are interested in the cost of accidents per vehicle and not the cost of accidents per casualty, we shall create a conversion table as follows:

	Casualties 2016	Cost to the economy per casualty (PET 2012) in NIS millions	Total cost to the economy in NIS millions	No. of accidents per year	Cost to the economy per accident in NIS millions
Killed	335	6.1	2043.5	266	7.7
Severely injured	1845	2.4	4437.2	1348	3.3
Slightly injured	20056	0.4	8864.8	13517	0.7
Total	22236		15345.5	15131	

Table 7: Cost to the economy of traffic accidents in Israel (in NIS millions)

As can be seen from this table, on average there is more than one casualty in a traffic accident and therefore the cost per accident is slightly higher than the cost to the economy of each casualty. It should be noted that these are only averages, but the conclusion is that a fatal accident causes average damages of NIS 7.7 million, an accident with severely injured casualties will result in damages of NIS 3.3 million, and an accident with slightly injured casualties will cause damages of NIS 700,000.

We shall substitute these figures into the traffic accident data in Israel:

Age of vehicle (years)	Total	Up to 3	4 to 6	7 to 9	10 to 12	13+
Total no. of vehicles in fleet	**2,726,835**	**931,127**	**574,533**	**530,098**	**279,791**	**411,286**
Total no. of vehicles involved in accidents	**15,131**	**4,239**	**3,264**	**3,127**	**1,765**	**2,672**
Fatal	266	63	66	46	37	53
Severe	1,348	386	269	267	170	250
Light	13,517	3,790	2,929	2,814	1,558	2,369
Percentage of vehicles involved in accidents out of total vehicles	**0.555%**	**0.455%**	**0.568%**	**0.590%**	**0.631%**	**0.650%**
Fatal	0.010%	0.007%	0.011%	0.009%	0.013%	0.013%
Severe	0.049%	0.041%	0.047%	0.050%	0.061%	0.061%
Light	0.496%	0.407%	0.510%	0.531%	0.557%	0.576%
Total cost of accidents in NIS millions	**15,345**	**4,240**	**3,313**	**3,078**	**1,866**	**2,784**
Fatal	2,044	484	507	353	284	407
Severe	4,437	1,271	885	879	560	823
Light	8,865	2,486	1,921	1,845	1,022	1,554
Annual cost of accidents per vehicle in NIS millions	**5,627.58**	**4,553.79**	**5,767.13**	**5,806.02**	**6,667.86**	**6,768.37**
Saving by scrapping vehicles for safety reasons and replacing by new vehicles		–	**1,213.35**	**1,252.23**	**2,114.08**	**2,214.58**

Table 8: Calculation of the annual cost of road accidents in Israel and the saving by scrapping vehicles, by vehicle age in years.

As can be seen, substituting the cost data and multiplying them by the number of traffic accidents leads to a significant result – traffic accidents cause economic damage of over NIS 15 billion per year, with old vehicles, which have a tendency to be involved in more, and more fatal, accidents, intensifies the economic damage to the state. **If all vehicles over the age of 13 were to be scrapped, the Israeli economy could save over NIS 800 million a year just due to safety**

issues. If we calculate the costs per vehicle on the road, we would find that the safety cost (i.e. the cost per vehicle due of the possibility of being involved in an accident) of a new vehicle is significantly lower than the safety cost of an older vehicle. In fact, the cost is lower by NIS 2,214 per year. **In other words, a new vehicle equipped with modern active safety systems saves over NIS 2,200 every year compared to an old vehicle due to safety-related savings. In terms of the economy, taking an old vehicle off the road and replacing it with a new and safe vehicle has a value of up to NIS 2,214 per year**.

1.3) State income due to replacing old vehicles by new ones

The vehicle market is one of the important sources of income for the State of Israel. In 2017 NIS 9.1 billion (excluding VAT) went into the state coffers just as a result of taxation on the purchase of vehicles. In addition, the state levies excise duty and VAT on fuel, licensing of vehicles and drivers, and all the vehicle maintenance activities throughout its life. State revenues are sensitive to changes in the import of vehicles to Israel, so encouraging the import of new, safe and non-polluting vehicles will not only bring benefits due to pollution reduction and increased safety, but will also bring significant revenues to the state from taxation.

According to data from the Tax Authority, in 2017, each vehicle imported to Israel contributed an average of NIS 34,915 to the state coffers directly (excluding VAT). Economically, scrapping a vehicle creates a chain of events. One can reasonably assume that the vast majority of scrapped vehicle owners will turn to the market and look for a replacement vehicle. The high demand that will be directed at the used and new vehicle market will cause other sellers to sell them a used vehicle and buy a new vehicle for themselves. In this way, there will be a certain high demand for new vehicles. This pressure will in fact cause a significant proportion of used vehicle owners to bring forward the sale and purchase operation, resulting in bringing forward tax receipts. In this sense, the newer the vehicle that was scrapped, the higher the tax increase the state will "gain" from the move.

CBS data over the past 30 years show a direct and clear connection between the growth of the GDP and the growth of the car parc in Israel. This means that in Israel the car parc is determined according to the number of residents in Israel and their economic situation. Accelerating the scrapping and removal of old vehicles will lead to high demand and an increase in the purchase of new vehicles at a ratio of close to 1:1, especially if the voucher method proposed in this document is adopted.

Figure 6 in Chapter C shows the calculation of the increase in state revenues following the replacement of old vehicles by new ones.

1.4) The benefits to the Israeli R&D sector as a result of improving the technological environment

Israel is gradually becoming a global power in the field of smart transportation technologies. The acquisition of Waze or the Mobileye transaction are just the tip of the iceberg. In Israel there are dozens of startups in the automotive area that are global leaders in areas such as cyber and remote sensing.

The entry of the fifth generation (5G) technology to Israel together with an investment flow of hundreds of millions of dollars, combined with the increasing traffic jams and the tendency of Israelis to be "early adopters", will allow Israel to become a beta site for additional modern technologies in the field of autonomous vehicles, electric vehicles and modern and complementary types of vehicles. Many companies recognize the relative advantage of Israel and invest in Israeli companies and even establish innovation centers here. Recently, many car companies have opened innovation centers in Israel engaged in research and development.

However, for Israel to become a significant beta site it must maintain a high level of technology in its vehicle fleet, and the proliferation of old vehicles without advanced technologies might, over the next decade, become a burden on the Israeli innovation system. Early scrapping of vehicles and lowering the median age of vehicles on the road in Israel today will also allow the Israeli innovation system to use the local ecosystem as a beta site and develop the technologies that will lead the transportation of the future.

1.5) Summary of the economic benefits from a smart scrapping system

The presence of old vehicles on the road has far-reaching environmental, safety and budgetary implications. If we sum up the effects reviewed in previous chapters, we will find that removing an old vehicle from the road and replacing it with a new one has an external economic benefit of between NIS 2,500-3,500 per year, in addition to being a source of state budget revenue of tens of thousands of NIS in taxes.

Appendix 2: A review of global practices

Programs for renewing vehicle fleets by incentivizing consumers through vehicle taxes, scrapping old vehicles, or exporting old vehicles to developing countries, along with their main goal (which is to improve safety and environmental protection), have in the past also been a way to provide an incentive to the economy in times of recession. The most notable example of the sweeping and transverse adoption of fleet vehicle refreshing programs came after the global economic crisis of 2008-2009. In these years many countries implemented such programs, under the assumption that in addition to being significant for reducing air pollution and improving road safety, they are also have a significant role in driving the economy and supporting manufacturers. This is especially noticeable in scrapping programs, which will be detailed later in the chapter.

Incentivizing by vehicle taxes and indirect payments

A. **Purchase taxes** One-time levying of tax upon registration of the vehicle license, usually levied on the first purchaser of the vehicle from the manufacturer or importer. Differential purchase/registration taxes can be planned according to various criteria, such as fuel consumption, harmful gas emissions, etc. (In Israel, this method is operated using the green tax formula.)

B. **Feebate (fee/rebate)** – a tax/subsidy which is separate from the purchase taxes, which is levied on the buyers of "polluting" vehicles, or alternatively rewards "clean" vehicle buyers. The feebate is relatively easier to plan so that it is budget-neutral, meaning that the grants the government is required to pay are offset by the taxes it collects. However, consumer behavior can change as a result of the feebate, which prevents the assurance of complete offsetting.

C. **Vehicle Circulation Taxes**, or Vehicle Road Tax – An annual fee for licensing a vehicle to travel on the road. Traditionally this fee is differential according to criteria such as engine volume, weight or power, but recently environmental criteria have been introduced, such as pollutant emissions, mileage (Distance Based Charges), and even safety criteria such as the installation of advanced safety technologies.

D. **Subsidizing vehicle insurance –** a benefit in the form of a state subsidy of the cost of the annual vehicle insurance in line with the installation of technologies that increase safety or reduce pollutant emissions (applied in Israel as a benefit on safety systems).

E. **Subsidizing the fuel (Carbon Tax)** – taxation of fuels according to their carbon content. This tax exists in the transportation sector and other sectors and its purpose is to incentivize drivers to prefer vehicles that consume less polluting fuels (applied in Israel as part of the excise tax).

F. **Scrapping grants (scrappage schemes) –** Scrapping grants are in effect a fiscal incentive. There are two main types of scrapping grants: a grant for scrapping only, and a grant for replacement by a new vehicle that meets defined criteria (the voucher method). In the first case, too, it can be assumed that removing the old vehicle from the vehicle fleet will result in the entry of a new vehicle into the fleet, and completing the move by differential purchase

taxes can incentivize the entry of vehicles which are less polluting than those that have been scrapped even if the grant is not given in the form of a voucher. The voucher method is considered preferable when it comes to facilitating the use of the benefit, since most people who scrap their vehicle aim to purchase a newer but used vehicle, and can realize this benefit through the voucher.

United Kingdom

As early as 2001, the British government included, as one of the criteria that determine the level of **the annual licensing fee**, the levels of CO2 emissions per kilometer. In 2011, the government increased the number of pollution ratings to 12, with each rating having a limited range of 10-15 grams/km of CO2. Table 9 below shows the ranges of the levels and the licensing fee for each of them. In addition to the regular annual licensing fee, in the first year of registration, vehicles rated M, the most severe pollution rating, are required to pay a particularly high one-time vehicle registration fee, the purpose of which is of course to deter the purchase of polluting vehicles in the first place. Furthermore, vehicles that do not consume diesel or petrol fuel (electric vehicles, for example), receive a small discount from the price of the annual license fee (£ 10 less than vehicles with corresponding CO2/km levels).

CO_2 emissions figure (g/km)	Petrol and diesel cars (tax class 48 and 49)	Alternatively-fuelled car (tax class 59)
	12 months (£)	12 months (£)
0	-	0.00
1-50	10.00	0.00
51-75	25.00	15.00
76-90	105.00	95.00
91-100	125.00	115.00
101-110	145.00	135.00
111-130	165.00	155.00
131-150	205.00	195.00
151-170	515.00	505.00
171-190	830.00	820.00
191-225	1240.00	1230.00
226-255	1760.00	1750.00
>255	2070.00	2060.00

Table 9: The annual licensing fee in the UK according to degrees of pollution as of 2018 (source: ACEA 2019).

Several years after the start of the licensing fee reform, surveys were conducted to examine its impact on the behavior of the British consumer. **It was found that about half of the Britons stated that they would buy a vehicle with a lower CO2/km rating than they had planned, if the difference in the rating would save them at least £ 180 in the annual licensing fee**. Similarly, a saving in the annual fee of £ 360 will result in about 72% of Britons purchasing a vehicle with a lower CO2/km rating than they would otherwise have purchased (Brand 2013)..

In addition to the incentives in the annual licensing fee, there is a benefit in the UK for buyers of low-pollution vehicles, which is funded by the government through vehicle dealerships. These benefits range from £ 3,500 to £ 8,000 (ACEA 2019).

Norway

In 2007, the Norwegian government passed a reform regarding the initial vehicle registration tax, with the aim of reducing CO_2 emissions in the Norwegian vehicle fleet. The reform replaced the engine size component in the taxation formula with the CO_2 emission component. However, the reform had a by-product, the significant increase in the purchase of diesel vehicles, which are known to be highly polluting at the local level due to the intensity of the emissions of harmful gases other than CO_2, which have negative health consequences. The reform has led to this consumer behavior since diesel vehicles have a higher than average engine capacity, but lower than average CO_2 emissions, along with the fact that diesel fuel is cheaper than petrol in Norway. Thus, the goal of the reform had been ostensibly achieved - the average amount of emissions was reduced, but with a negative by-product in an area that is not monitored by the EU due to its having local effects only (Ciccone 2018).

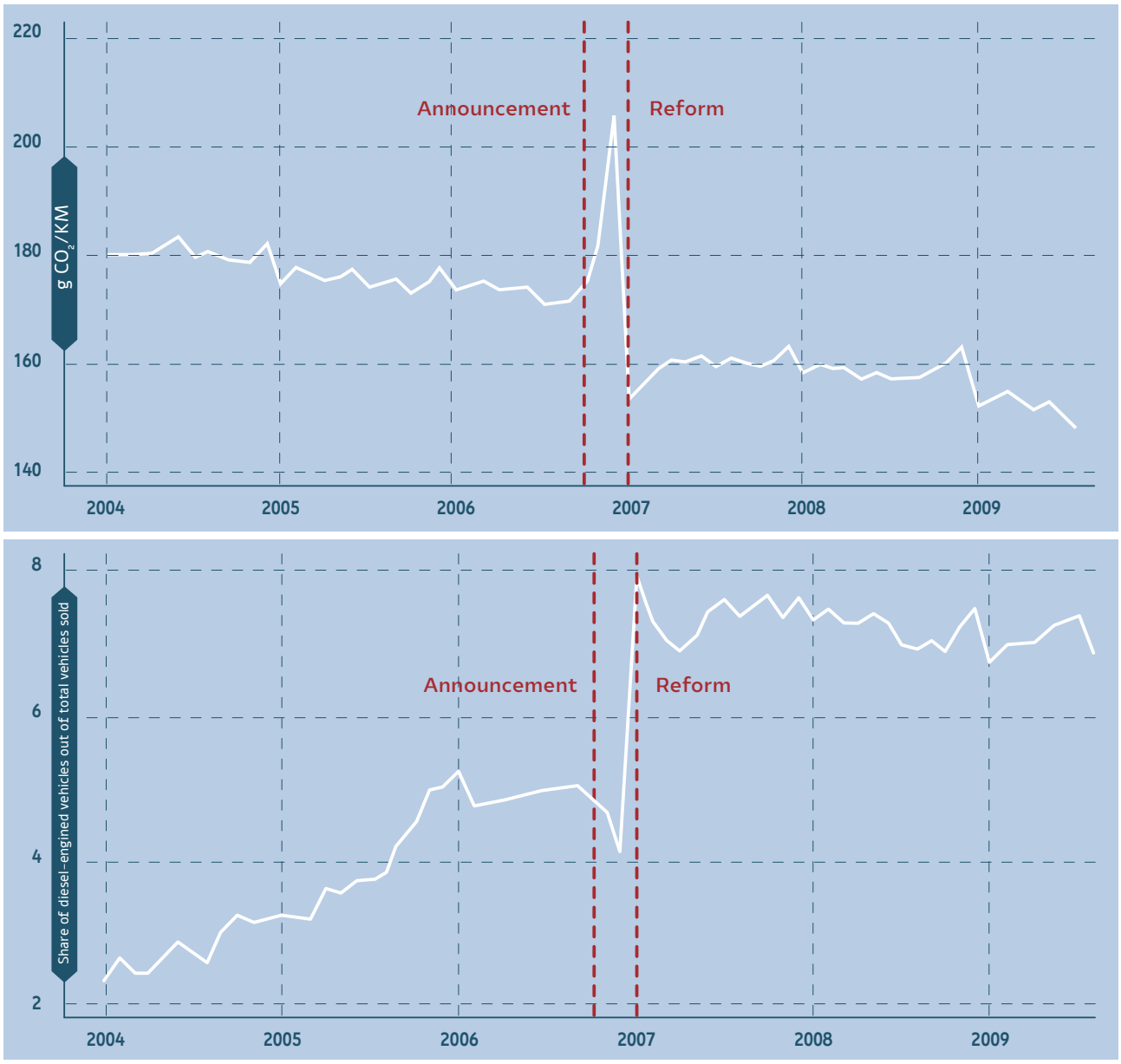

Figure 12: Impact of a differential registration taxation tax according to the amount of emissions in Norway. Upper graph - monthly average of CO_2 emissions of new vehicles purchased in Norway in the years 2004-2009; Lower graph – the share of diesel vehicles out of the total number of new vehicles purchased in a given year (source: Ciccone 2018).

France

In France the CO_2 emissions are taken into account in the formulas for the calculation of most vehicle taxes. There is a reduction in purchase taxes (VAT) according to the level of emissions, with the levels of emissions being updated every year. In the initial registration taxes on new vehicles, a bonus/malus method was introduced in 2008; this is a type of feebate, and includes taxation according to emission levels, which in turn is supposed to fund grants to "clean" vehicles. The grants are given to vehicles with emissions below 20 grams/km CO_2, which are mostly electric vehicles, and their value is set at about 27% of the purchase price, up to a maximum of € 6,000. **In all the cases which qualify for a grant, there is an additional bonus of € 200 for scrapping of a vehicle more than 15 years old.** The aim is to achieve a budgetary balance between the total taxation and the total grants distributed per year (ACEA 2019). The results of this reform were very positive and achieved their goal, with the average CO_2 emissions per km in the light vehicle group becoming the lowest in the EU (Brand 2013).

For vehicles registered in France after 2009, the annual fees are also determined by the level of CO_2 emissions per kilometer, with the threshold for payment of an annual fee of € 160 detailed below. For vehicles whose emission level is not available (vehicles manufactured before 2009), the fee is determined according to engine power, and is significantly higher, as can be seen in Table 10.

		2017	2018	2019
Starting Point	CO_2 g/km	127	120	117
	Malus	€50	€50	€35
End Point	CO_2 g/km	191	185	191
	Malus	€10,000	€10,500	€10,500

Table 10: The schedule of the taxation (malus) imposed in France on the owners of polluting vehicle owners (Source: ACEA 2019).

For company vehicles that were first registered after 2009 there is a different differential fee which is determined by pollution levels, with a variable tariff for CO_2/km, ranging from € 0 to € 29 per unit of carbon per kilometer. **Thus, in the annual vehicle taxes, the French system imposes most of the taxes on companies and owners of vehicles aged 10 years and over, while "clean" vehicles pay a particularly low tax and in some cases are tax-exempt.**

Year of first registration	CO_2 emissions (in g/km)
2009	250
2010	245
2011	245
From 2012 onwards	190

Table 11: The lower emission threshold for each model year after 2009 in France. For vehicles whose emissions exceed the specified threshold, an annual fee of € 160 Euros is levied (Source: ACEA 2019).

Fiscal power (hp)	Amount of the tax (€)
≤3	750.00
4-6	1400.00
7-10	3000.00
11-15	3600.00
>15	4500.00

Table 12: The differential annual fee for vehicles aged over 10 years (that were first registered before 2009) by engine volume. This fee is significantly higher than that charged for newer vehicles (Source: ACEA 2019).

SWEDEN

In 2006, an annual Environmental Excise Duty was imposed in Sweden on vehicle owners, which included a base tax equivalent to £ 30 and a variable tax of £ 1.3 per gram of CO_2 in excess of 100 grams/km CO_2. The annual tax in the above calculation applies to vehicles manufactured since 2006. The tax is multiplied by 2.37 for diesel vehicles, and the marginal cost per CO_2/km is halved for vehicles with technology that allows the use of alternative propulsion (electric, hybrid etc.). Vehicles manufactured before 2006 are subject to an annual tax according to weight and fuel consumption (ACEA 2019). The tax incentive was crowned a success, since by the middle of 2007 the percentage of vehicles with low emission levels increased from 2.9% in 2005 to 14.3%.

In 2018, a new "climate incentive" was implemented for the purchase of light vehicles, according to which new vehicles with emissions of less than 60 grams/km CO_2 are entitled to a differential grant of up to 60,000 kronor (approximately € 5,600). This incentive has replaced the exemption from the payment of an annual fee for the first 5 years on a vehicle that meets the criteria of a "green vehicle". (ACEA 2019).

Appendix 3: Other practices in Israel for rejuvenation of the national vehicle fleet

In Israel, since 2009 there a "green tax" has been part of the Israeli vehicle taxation system. As part of the reform, all vehicles up to 3.5 tons are classified into 15 pollution levels determined according to the green score. This is calculated for each vehicle model on the basis of its emission data of 5 types of pollutants: CO2 (carbon dioxide), CO (carbon monoxide), (NOx) nitrogen oxides (HC) hydrocarbons, and PM (breathable particulate matter). The purchase tax ranges from 10% of the price of the vehicle in the case of an electric vehicle, and up to 83% of the price of the vehicle in the case of a vehicle with an internal combustion engine. (On luxury vehicles there is an additional tax of about 20%). Alongside the differential tax rates, there is also a tax credit that is also determined according to the pollution level (along with safety levels). This reform has significantly changed the mix of imported vehicles.

Pollution level	Green score	Purchase tax benefit (in 2006 prices)	% of total sales in 2017	Average effective purchase tax*
1 (zero emissions)	0-50	Purchase tax 10%	0.0%	10%
2 (plug-in up to 100 green score)	0-100	Purchase tax 20%	0.5%	19%
2 (hybrid)	51-130	Purchase tax 30%	7.8%	29%
2	51-130	16,383	0.0%	
3	131-150	15,018	5.6%	36%
4	151-170	13,106	21.4%	48%
5	171-175	11,469	7.0%	50%
6	176-180	10,102	9.5%	57%
7	181-185	9,011	6.5%	64%
8	186-190	7,918	5.3%	61%
9	191-195	7,099	4.0%	66%
10	196-200	6,009	3.1%	69%
11	201-205	5,461	6.8%	67%
12	206-210	4,370	1.7%	70%
13	211-220	3,549	4.1%	72%
14	221-250	2,184	11.5%	76%
15	251+		5.1%	81%

Table 13: The purchase tax credit according to the pollution level in Israel (source: the Tax Authority, 2017)
* Purchase tax only

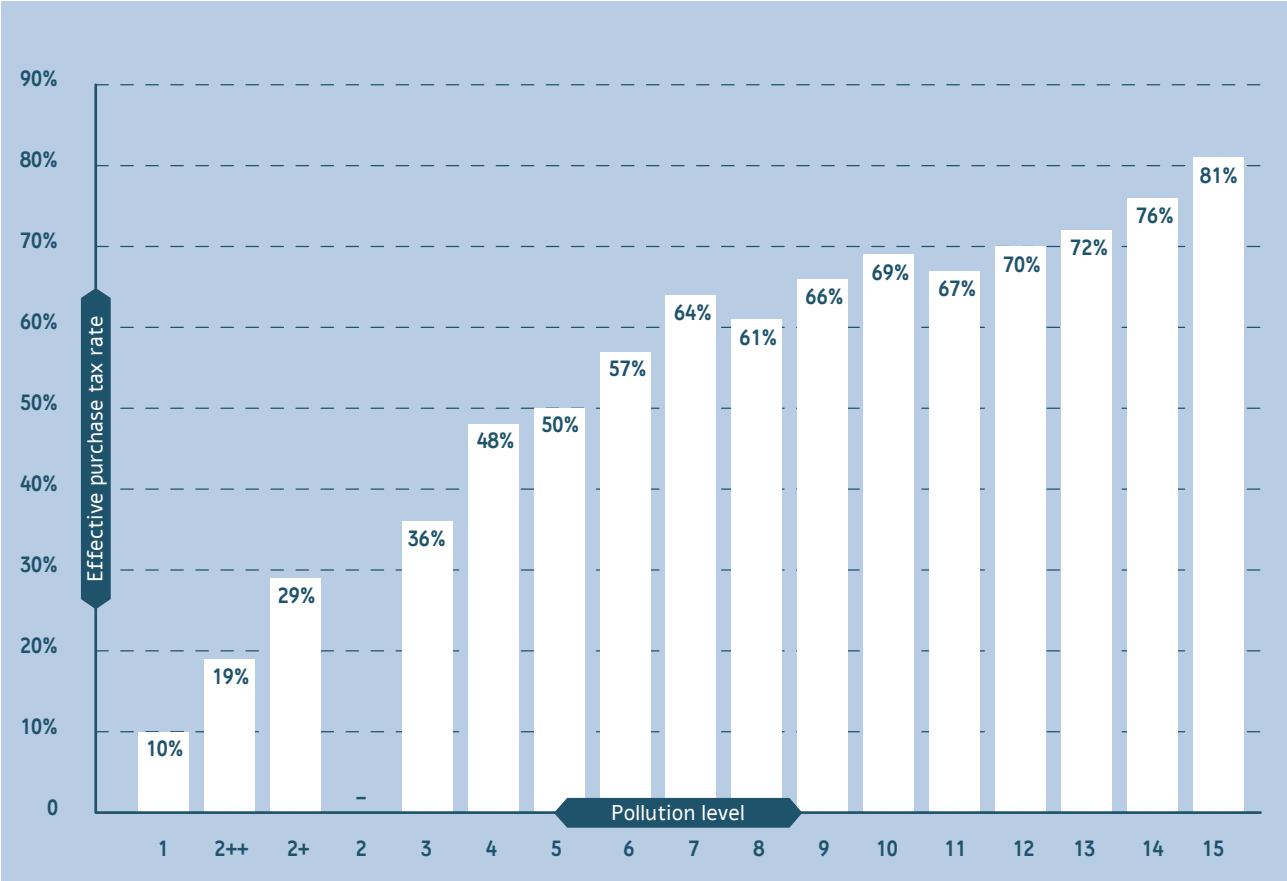

Figure 13: The effective purchase tax rate according to the pollution level, 2017 (source: the Tax Authority, 2017)

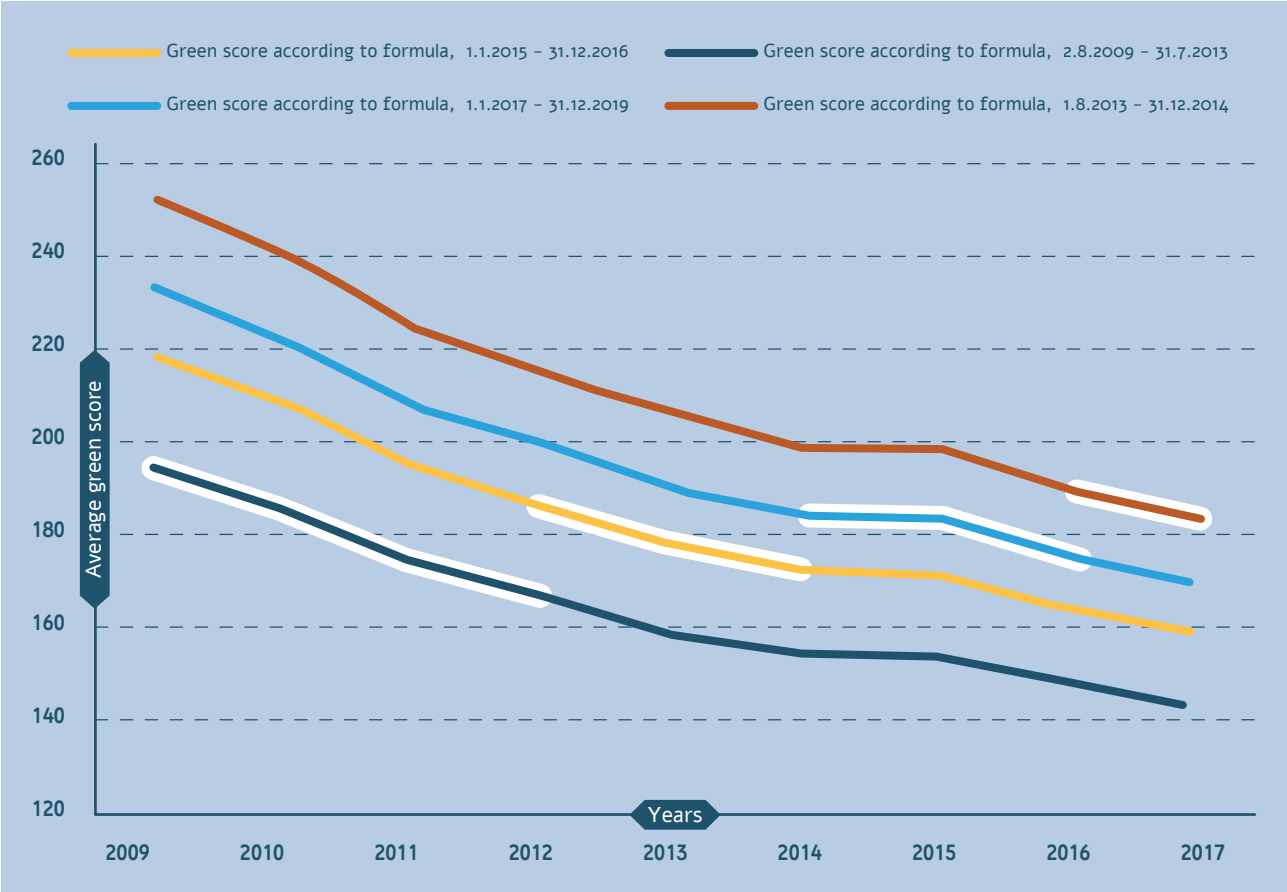

Figure 14: The development of the average green score of new vehicles according to year in the different formulas (source: the Tax Authority, 2017)

With the implementation of the reform, it was determined that the "green score" formula will be updated from time to time in order to maintain the right incentive in accordance with technological developments and changing tastes, and indeed the formula is frequently updated and has a significant impact on consumer behavior, as can be seen in Figure 14.

In August 2013, another component was added to the calculation of purchase taxes imposed on vehicle imported to Israel, based on the presence of advanced driver-assist safety systems, both active and passive. At the beginning of 2020, emphasis was placed on systems installed by the manufacturer and on active systems.

System	Score from 1.1.20	Score from 1.1.19	Score from 1.1.18	Score from 1.2.16	Score from 1.2.15	Score until 31.1.15	Possibility of local fitting
Lane departure warning	V	2	2	2	1.5	1	0
Active lane departure prevention					1	1.5	2
Monitoring distance from vehicle in front	V	2	2	2	1.5	1	
Automatic emergency braking			1	1	1	1.5	2.5
Adaptive cruise control		1	1	0.5	1	1	1
Pedestrian detection system	V	1	1	1	1	1	1
2-wheel vehicle detection system	V			0.5	0.5	0.5	0.5
Blind spot monitoring		1	1	1	1	1	1
7 + airbags (6 in commercial vehicles)		1	1	0.5	0.5	0.5	0.5
Reversing camera	V	0.5	0.5	0.5	0.5	0.5	0.5
Seat belt sensors front and rear		0.5	0.5	0.5	0.5	0.5	0.5
Automatic control of headlamps	V		0.5	0.5			0.5
Brake assist system		1					
Tire pressure sensors		0.5					
Traffic sign identification				0.5	0.5	0.5	0.5
Total possible points		10.5	10.5	10.5	10.5	10.5	10.5

Table 14: Safety systems and scoring for the purpose of determining the level of safety equipment (Source: Ministry of Transport, Procedure 03/13; Customs Tariffs).

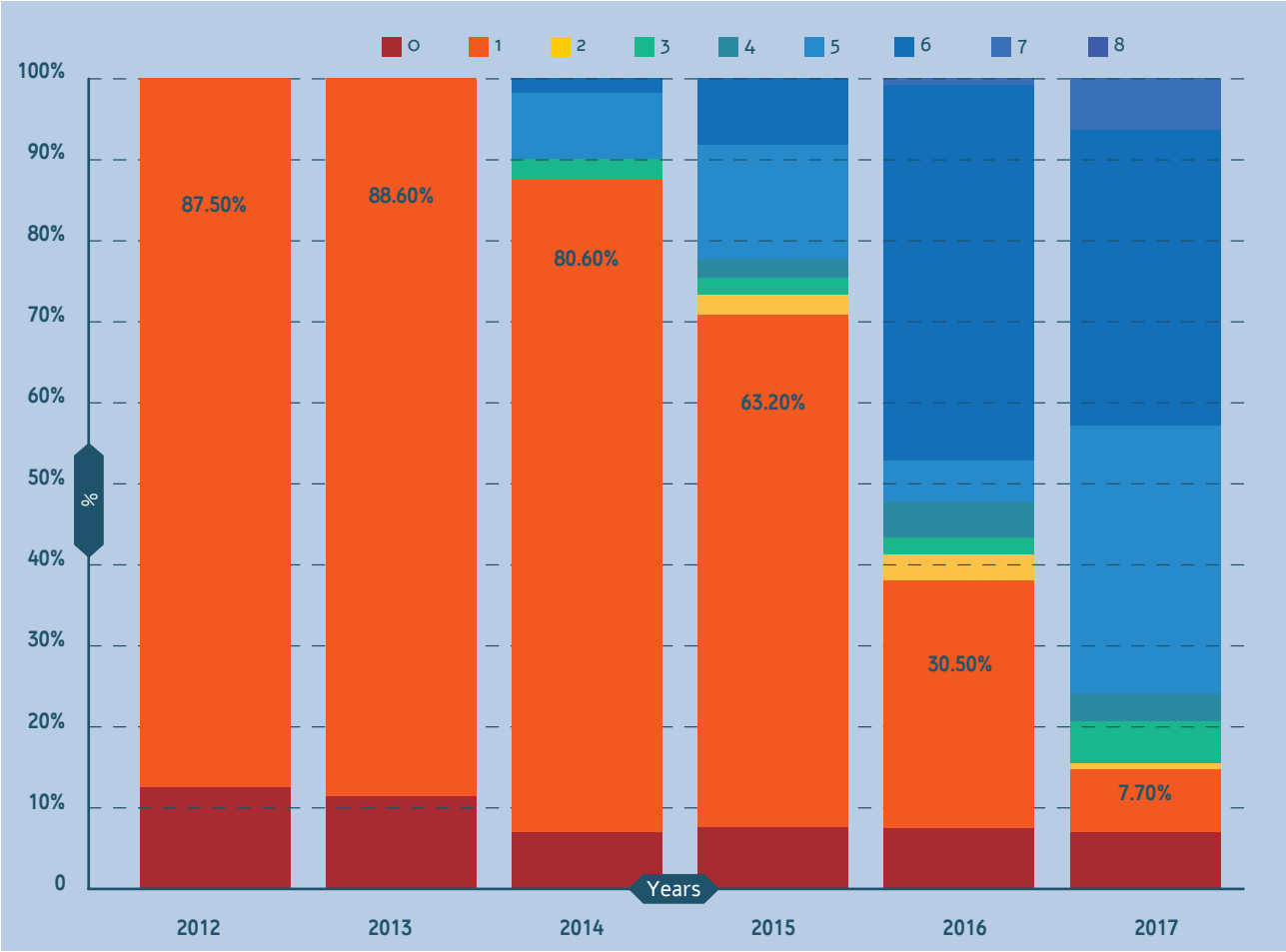

Figure 15: Distribution of imported vehicles (Passenger vehicles) according to the levels of safety equipment (Source: Ministry of Transport data, processing by the Planning and Economics Division, the Tax Authority).

		Required no. of airbags		Tax reduction (NIS)	
Safety equipment level	Required score	Passenger vehicles	Commercial vehicles	Until 31.12.16	From 1.1.17
0	–	0	0	–	–
1	–	6	4	500	250
2	2	6	4	900	650
3	3	6	4	1,250	1,000
4	4	6	4	1,550	1,600
5	5	6	4	1,800	1,850
6	6	6	4	2,000	2,050
7	8	6	4	2,150	2,250
8	6	6	4	2,250	2,400

Table 15: Requirements for setting the level of safety equipment (Source: Ministry of Transport, Procedure 03/13; Customs Tariffs).

Appendix 4: Congestion fees as a possible means of financing the scrapping program

The congestion on Israeli roads is an acute problem that has been getting worse in recent years and is a real burden on the population and on the Israeli economy. The time spent standing still in traffic jams is getting longer as the gap between the growth rate of total vehicle mileage and the growth rate of infrastructure increases.

In Israel and especially in the Tel Aviv – Jaffa metropolitan area, public transport does not provide a satisfactory solution, and the transportation mode split is one of the lowest in the Western world (only about 20% of travel is by public transport compared to 50% in similar metropolitan areas in the Western world). The plans for the future are not very encouraging either when it comes to public transport. According to the master plans of the Ministry of Transport from 2016, it seems that this trend will continue and the transportation mode split in the Tel Aviv metropolitan area is not going to change dramatically (from 20% to 26% usage of public transport in the next 20 years).

The characteristics of the Tel Aviv - Jaffa metropolitan area in comparison to European cities

	Tel Aviv-Jaffa metropolitan area 2014	Tel Aviv-Jaffa metropolitan area 2040	Madrid metropolitan area 2013	Berlin metropolitan area 2013
Population(millions)	3.7	5.2	5.3	4.5
Passenger trips (millions per day)	6	9	9.9	7.7
By private vehicles	4.8	6.7	5	4.2
By public transport	1.2	2.3	4.9	3.5
By public transport (%)	20%	26%	50%	46%
Number of MRTS lines* LRT/BRT*** **	-	2-5	3	3
Metro	-	-	12	10
Suburban railway	5	7	10	15

SOURCE: Ministry of Transport and Ministry of Finance. A strategic plan for the development of a Mass Rapid Transit System in the Tel Aviv-Jaffa metropolitan area, 2016.

* Mass Rapid Transit System

** Light Rail Transit

*** Bus Rapid Transit

Table 16: Characteristics of the Tel Aviv-Jaffa metropolitan area compared to European cities

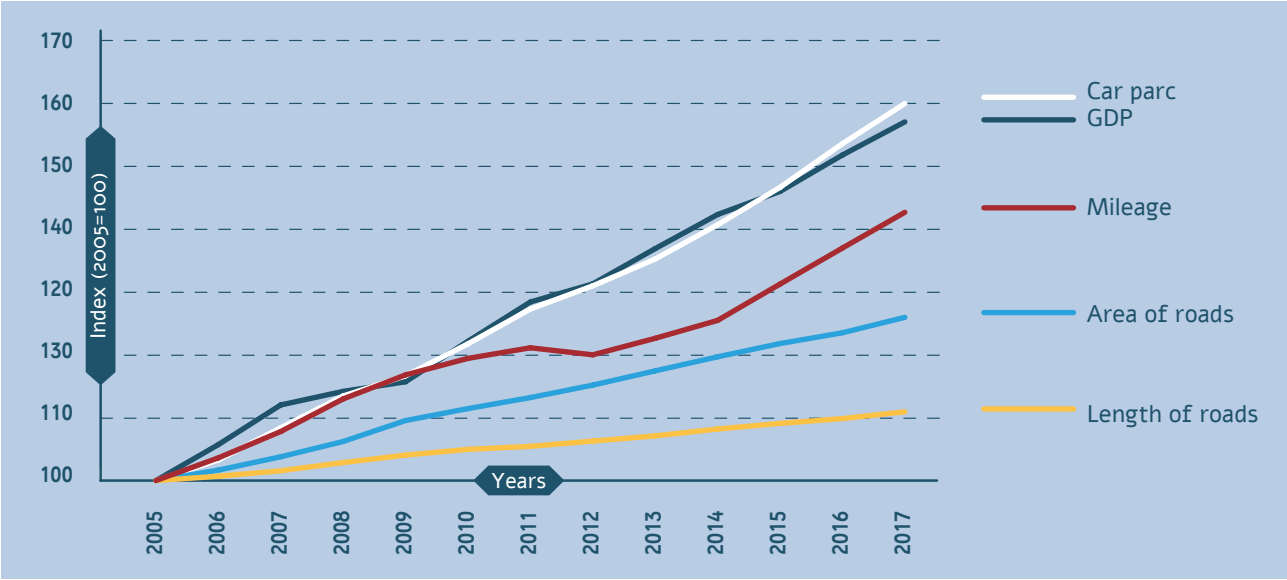

Figure 16: The increase in the number of vehicles, mileage and infrastructure development – 2005 – 2017

The increase in the number of vehicles, mileage and infrastructure development – 2005 – 2017

Due to the expected increase in demand for mileage (stemming from economic and demographic growth) and the inability of existing and planned roads and public transport infrastructure to meet it, the existing congestion on roads is only expected to increase, at least over the next decade.

Will the expected congestion reduce the rate of purchasing of new cars?

Our sober assessment is that it won't. In the absence of efficient public transport alternatives, households will continue to purchase on cars as a primary means of getting to work and school. As Israel currently lags far behind Europe in the ownership of vehicles (only 384 vehicles per 1,000 population compared to 500-600 in Western European countries in 2019) car sales are expected to continue to rise over the next decade.

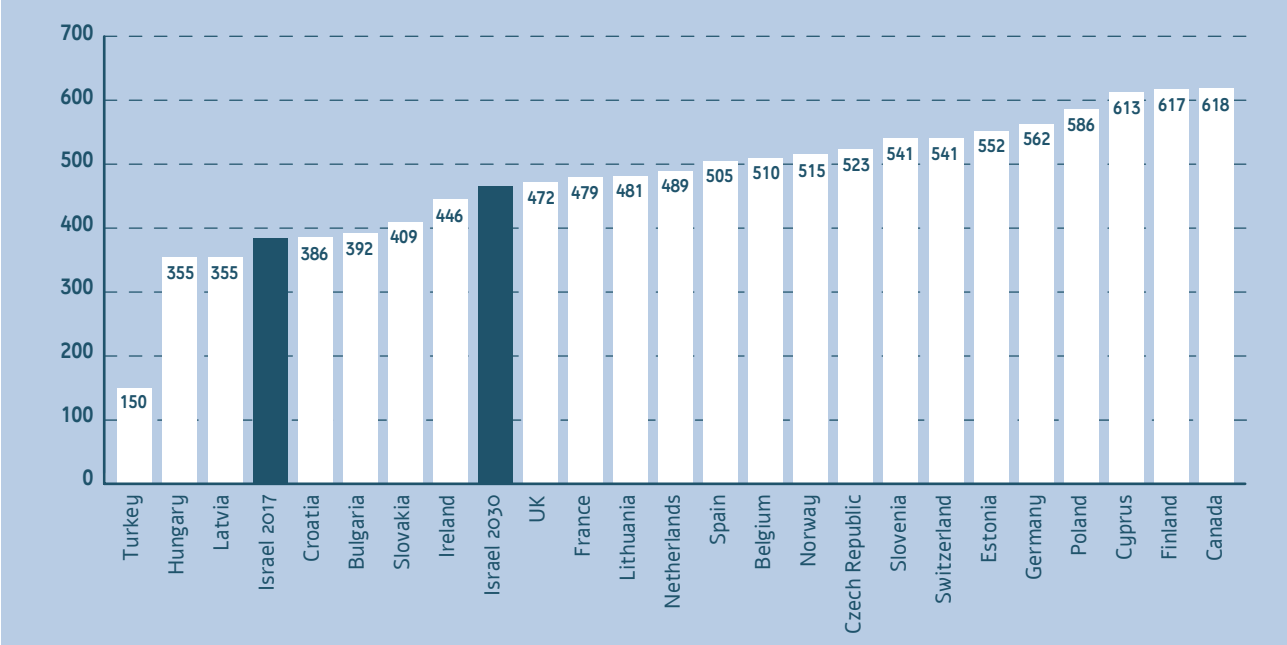

Figure 17: Vehicles per 1000 population – Israel 2017 and Israel 2030 compared to similar countries

Although the congestion on the roads will increase in the next decade relative to the current situation. it will not be unprecedented in global terms. In South Korea and Los Angeles, the traffic congestion today is already greater than that which is expected in Israel in 2030, given the continuation of the existing growth trends.

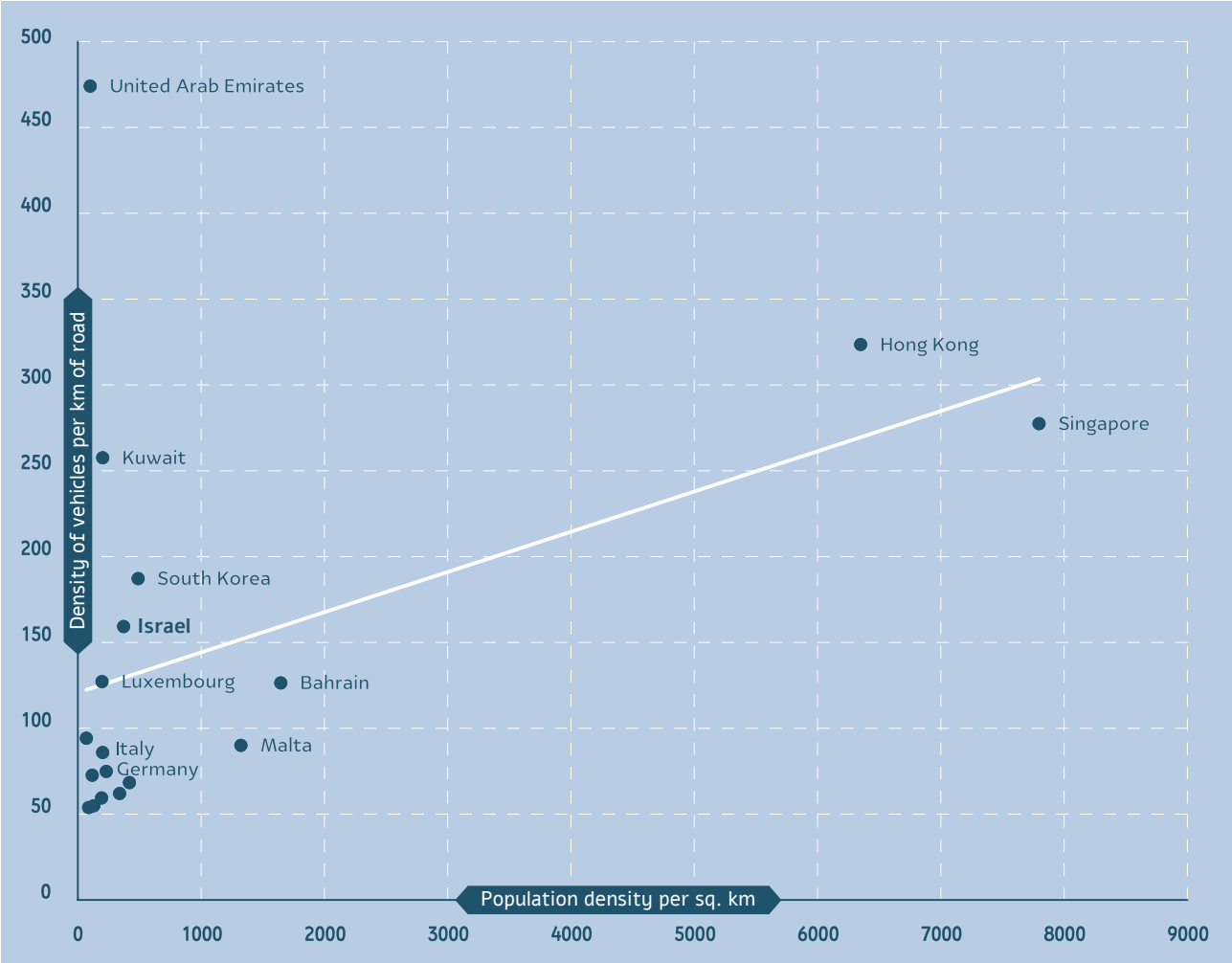

Figure 18: The number of vehicles per kilometer of road as a function of population density (population per square kilometer) in densely populated, high GDP areas

	Israel 2018	Israel 2030	South Korea	Los Angeles
GDP per capita in $ '000	40.2	50	29.7	67.7
Population in millions	8.9	11.2	48.5	9.8
Area in sq.km	22,072	22,072	99,500	12,300
No of vehicles in millions	3.43	5.2	22.8	6.433
Km of paved roads	19.5	23.3	106.4	34.4
Population density per sq.km	404	507	487	797
Vehicles per km of road	176	224	214	187
Vehicles per 1,000 people	384	466	471	656

Table 17: Comparison of density and congestion between Israel and other dense areas in the world

What can be done?

The government is working today to encourage public transport and shared transportation as much as possible, by allocating fast lanes for public and shared transport and accelerating public transport infrastructure projects.

In addition, projects of demand management and encouraging passengers to switch to travelling at different hours of the day are currently being considered. In this context, it should be mentioned the pilot project conducted by the Ministry of Transport to encourage drivers not to use their vehicle during rush hours.

Another project that is being examined at the same time is the imposition of a congestion fee on vehicles entering the center of Tel Aviv. This fee, which will be levied during rush hours, is expected to lower the demand and reduce traffic jams at the entrance to the city. This fee has been tested in various cities around the world and proven to be effective. If this project is implemented, an annual income of approximately NIS 1.5 billion per year is expected from this fee.

Appendix 5: The outcome of the implementation of the scrapping projects over a decade

The following model examines the implementation of a scrapping program over a decade. The model does not take into account the effect of the Covid-19 crisis into the calculations, but only assumes that about 60,000 vehicles will receive vouchers for being scrapped each year for the next decade. The result is clear - fewer old vehicles, more new vehicles and a higher level of safety that will result in fewer deaths on the roads. For convenience, the starting point of the model was taken in 2021, but it is expected to be similar in any starting year in which the model is applied.

The car parc of vehicles aged 15 years and above throughout the years of application of the model:

The most significant result of applying the model is a dramatic decrease in the number of very old vehicles (aged 15 and over) on the roads. The reason is that vehicles will be scrapped already when they are 9-14 years old and will not reach the ages of 15 and above.

The car parc of vehicles aged 9-14 years throughout the years of application of the model:

This car parc will decrease in the first years of the model's implementation and stabilize later on. These vehicles will be scrapped at an increasing rate in the first few years and then reach a certain plateau.

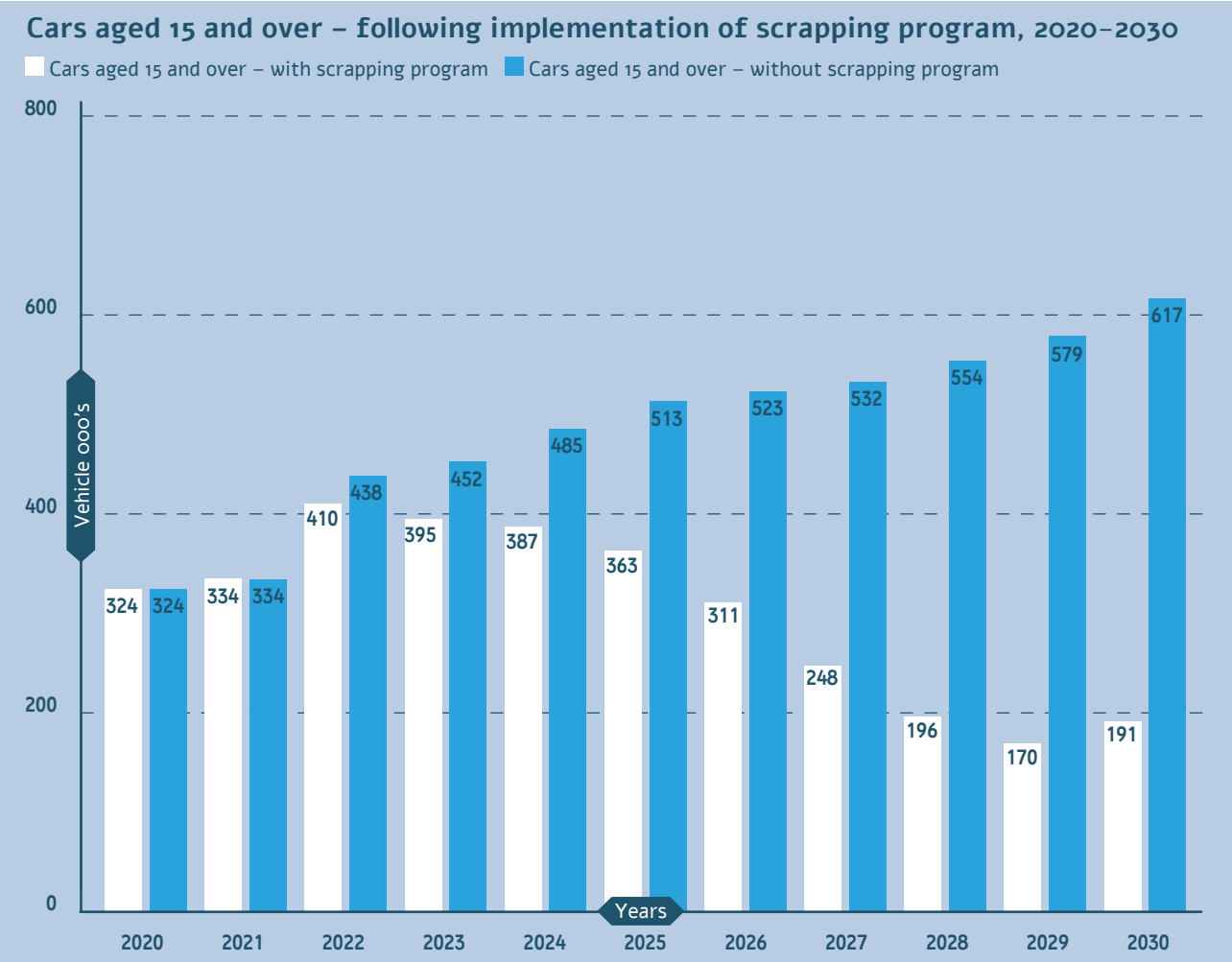

Figure 19: Vehicles ages 15 years and over in the car parc

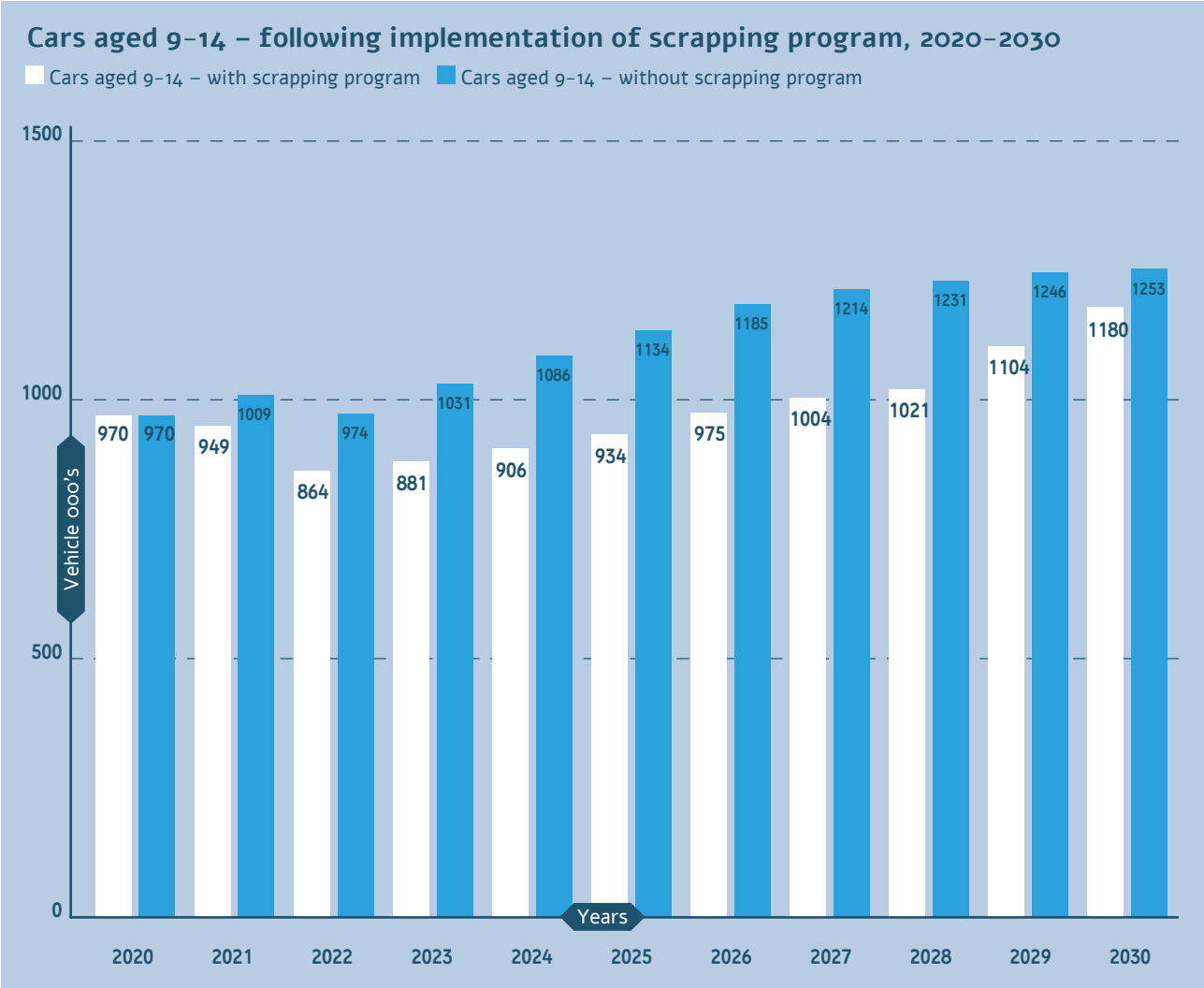

Figure 20: Vehicles ages 9–14 years in the car parc

Addition to the "natural" scrapping by years:

This program effectively clears the road of old vehicles over the next decade and lowers the median age from 15.5 to 12 years. In the coming years, many vehicles will be scrapped, but as the age of the vehicles decreases and the stock of old vehicles decreases, the scrapping rate will approach the current rate.

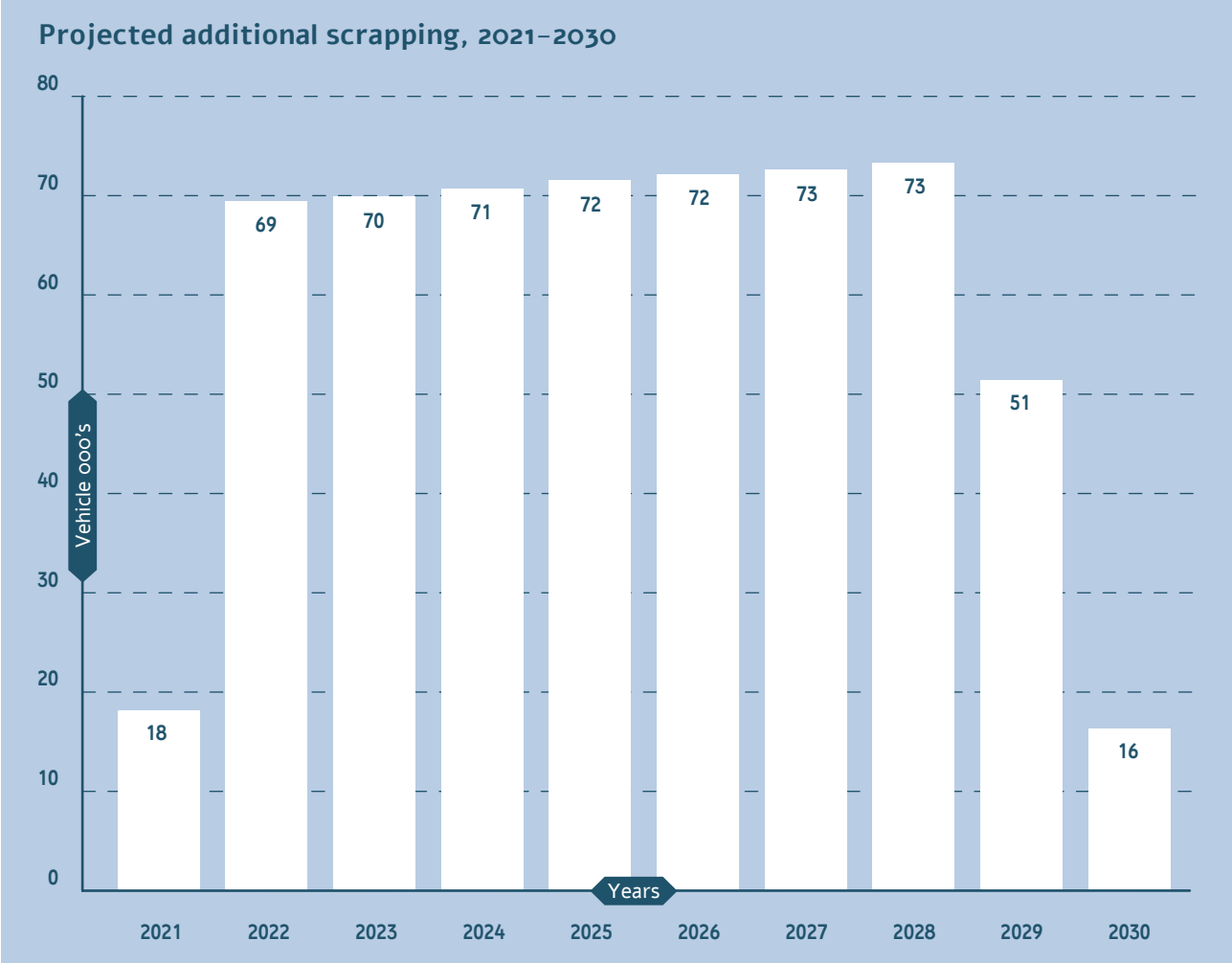

Figure 21: Addition to the "natural" scrapping by years

The state budget

The increase in the scrapping rate and the distribution of vouchers will increase the demand for modern vehicles. The close connection between the GDP and the car parc creates demand pressure for new cars as soon as the rate of scrapping increases. Therefore in the years in which a scrapping program will be implemented, the rate of purchase of new vehicles is expected to grow, and accordingly increase the state revenues from direct taxation, customs duty and VAT. The assumption is that in the first year, mainly the stock of existing used cars will be reduced, and only from the second year will we see the full replacement by new cars.

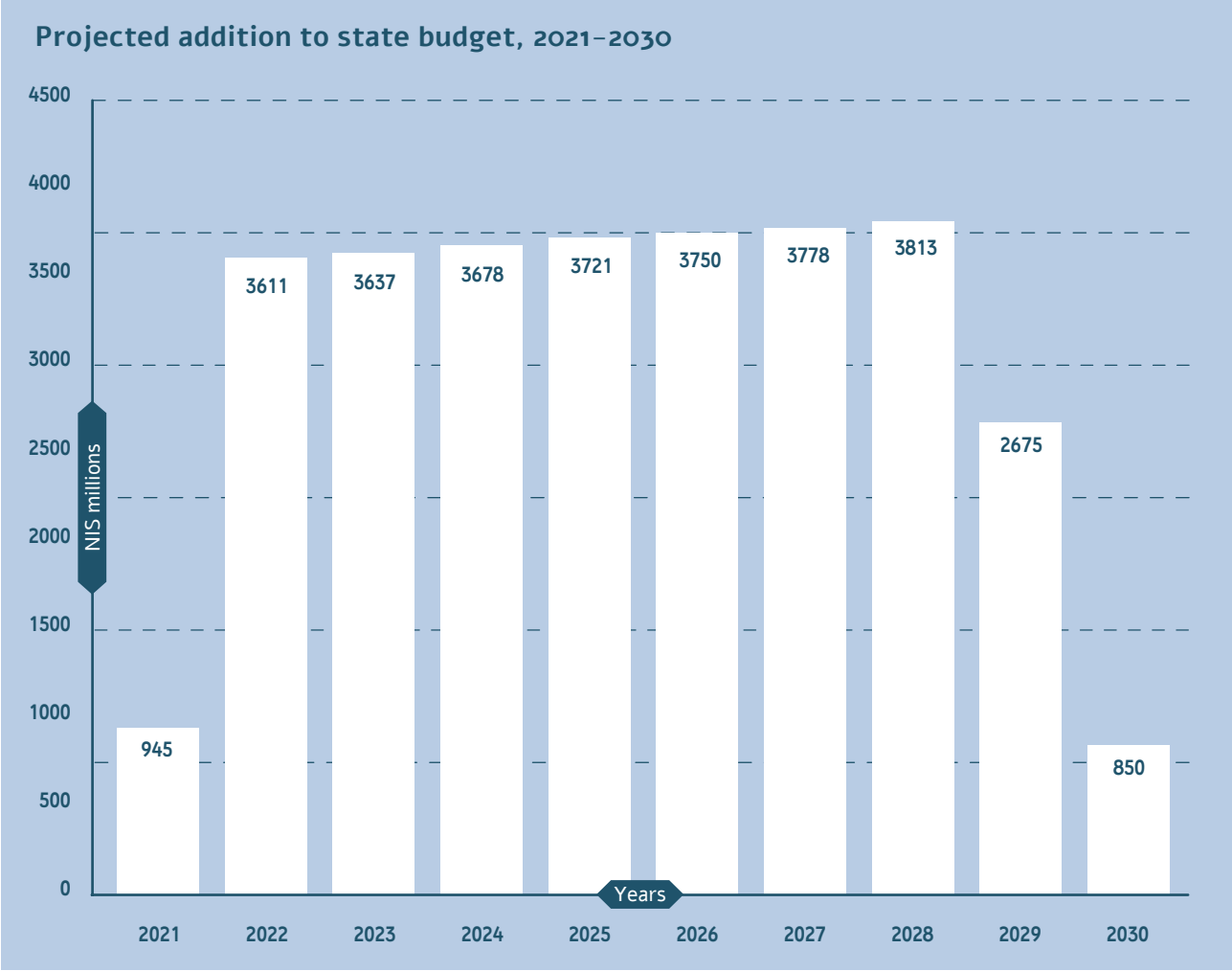

Figure 22: Addition to the state budget by years

Decrease in road fatalities:

In the years when the scrapping takes place, the average safety level of vehicles on the road is expected to rise significantly. In view of this, there will be more and more vehicles whose chances of being involved in accidents are lower. Starting from 2025, cars equipped with "zero-accident" safety systems will be introduced for the first time, and reduce the number of fatalities on the roads. The scrapping program will allow them to reach the road faster.

According to the model we tested, which assumes a 20% decrease in casualties starting with the 2022 models and an 80% decrease in casualties starting from the 2025 models, we will see a dramatic decrease in the number of fatalities on the roads in the next decade. With the implementation of a scrapping model, this decline will be accelerated and over the next decade and a half more than 300 additional fatalities are expected to be saved, and overall, a total of over 635 people are expected to be saved in the next decade and a half due to accidents that will not take place.

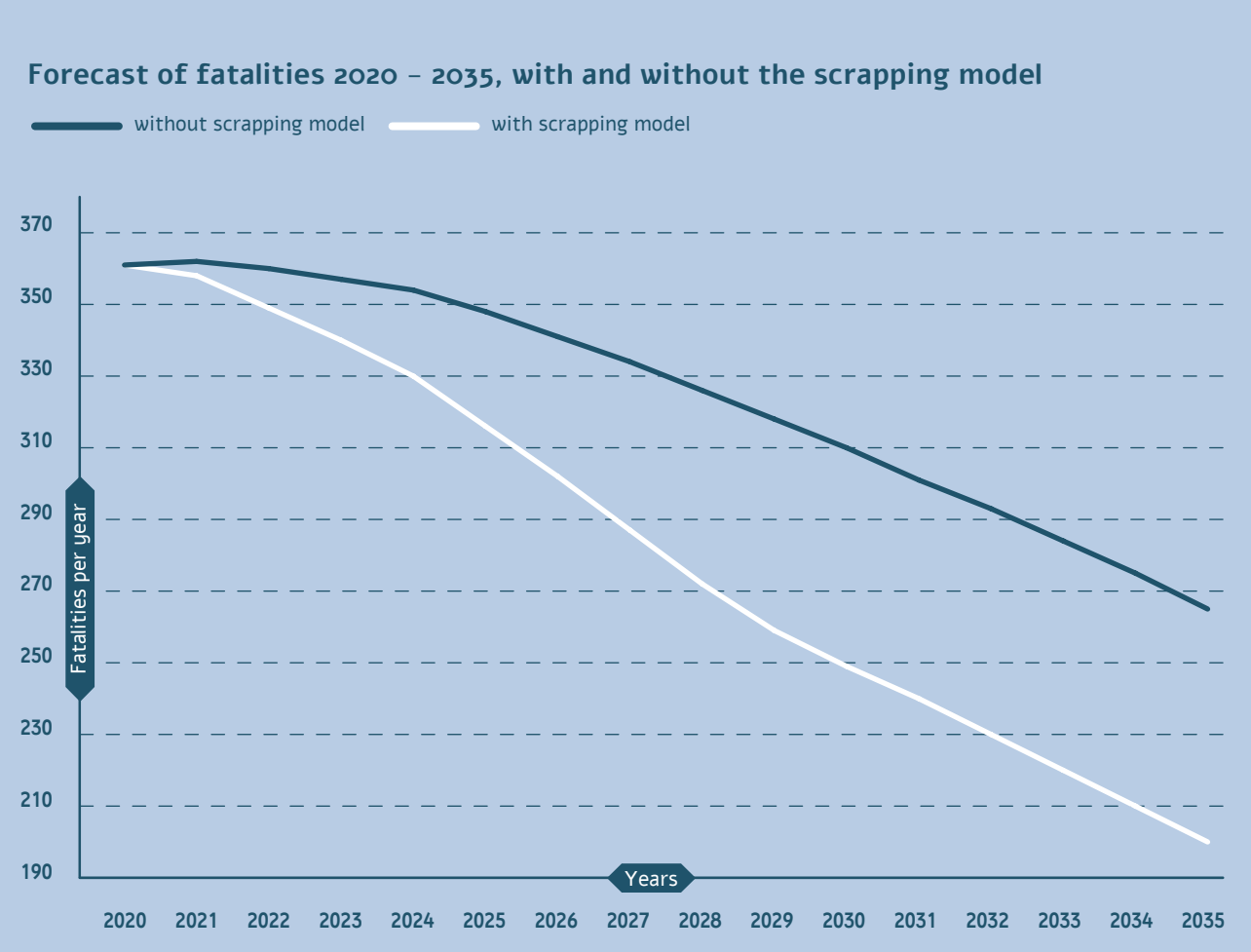

Figure 23: Forecast of fatalities with and without the scrapping model

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