TRANSPORTATION ROADMAP 2040 SUMMARY

Rohetiiger

PROLOGUE

The Transportation Roadmap 2040 is the third roadmap the Green Tiger has devised for the Estonian state to achieve a substantial reduction in the footprint of human activities, which is necessary for preserving the natural environment. Continuing on the course that has been followed so far is not sustainable, so we need to introduce major changes as a state and society to ensure that our future generations find the natural environment on the planet suited for life.

Transport as a sphere of activity is one of the cornerstones of the functioning of society and the economy. However, the growth of people’s mobility and the globalization of trade have substantially increased the footprint left by the sector over the recent decades, and following the same course will have a devastating effect on our ecosystem. Therefore, this roadmap aims to devise an action plan for a future-proof transport and mobility ecosystem based on the principles of minimizing the environmental impact on the one hand and ensuring the quality of the transport service adequate for the needs of the country’s residents and businesses on the other hand, which would contribute to Estonia’s competitive position.

The sector falls into the categories of road, railway, maritime and air transport; in addition, fuels are discussed as an overarching topic. The calculations are based on the data from the Estonian national greenhouse gas inventory, in which road transport emissions are broken down by the types of fuel consumed in Estonia while emissions from specific domestic operations are used for railway, maritime and air transport. The detailed proposals and discussions specific to certain areas of activity in the roadmap also apply to the rest of the sector.

The first part of the roadmap provides an overview of the current situation in the Estonian transport sector, including the volumes of goods and passengers over the last 5 years, the transport fleet in use, infrastructure and the most pressing challenges. In addition, it contains an analysis of the environmental impact of the current transport system and a summary of the sector’s framework documents that have the highest environmental impact. The second part of the roadmap features both the positive baseline scenario and the intervention scenario. For the latter to be enacted, propositions for specific changes are necessary which, if introduced, will allow the sector to achieve sustainable interaction with the environment.

In Estonia, the transport sector accounts for approximately 16% of the country’s greenhouse gas emissions.

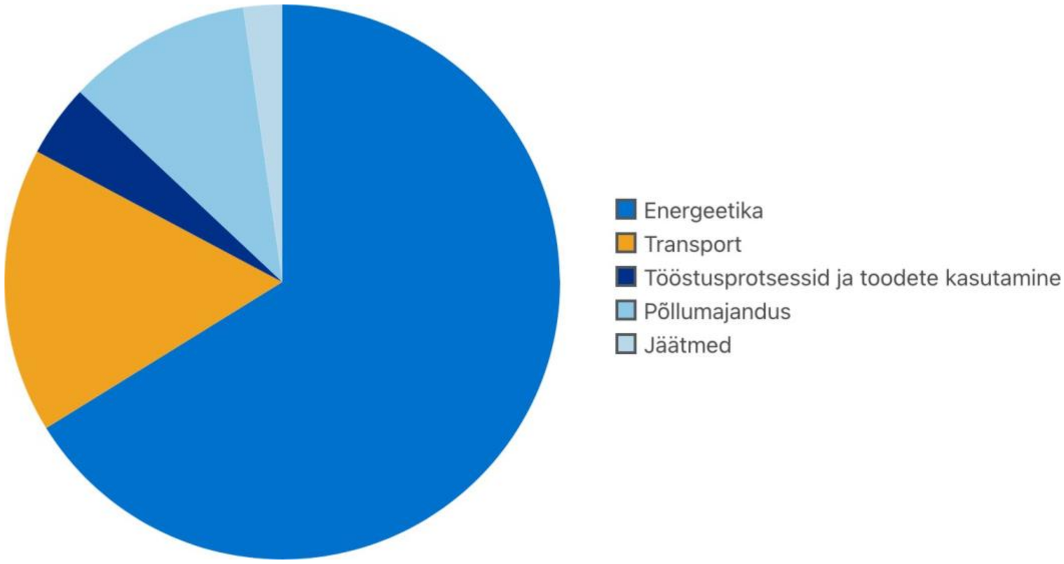

Figure 1. Distribution of Estonia's greenhouse gas emissions by sectors. *Source: kasvuhoonegaasid.ee.*

Energeetika	Power industry
Transport	Transport
Tööstusprotsessid ja toodete kasutamine	Industrial processes and the use of products
Põllumajandus	Agriculture
Jäätmed	Waste

The measures discussed so far provide no possibility of achieving the necessary reduction of the carbon dioxide equivalent in the transport sector. Achieving the goal requires ambition as well as significant and fundamental changes in the sector, so this publication aims to describe the extent to which the sector needs to change in order to achieve a 90% decrease in the carbon dioxide equivalent by 2040.

CHALLENGES

Throughout the transport sector, the most pressing issues include the use of personal cars, a decrease in the use of public transport and other, active travel modes, and the energy efficiency of the fleet in road, railway, maritime and air transport.

The biggest challenge **in the segment of passenger transport and mobility within road transport** lies in the increasing negative environmental impact if the current trend of increasing car ownership continues. Contrary to the government's goals concerning people's preference for environmentally sustainable modes of travel, the share of using sustainable modes of transport to go to work fell from 38.5% to 34.3% in the past five years. More than half of urban dwellers and more than 70% of rural residents go to work by car. At the same time, the share of those who go to work by car in urban areas increased over the period of five years while it decreased slightly in the countryside. The share of people using public transport to go to work decreased by nearly a quarter in 5 years among urban and rural residents alike.
Cars and vans account for the majority of the motor vehicle fleet in Estonia, i.e. 96%, while trucks constitute 3.5%, and buses account for 0.5%. As in 2021, there were on average 621 car per 1000 residents, which landed the country the 5th in the European Union with its average number of 567 cars per 1000 residents (the average number of cars per 1000 residents increased by 6% between 2017 and 2021 in the EU and by 12.5% in Estonia). The fleet mileage in the past five years exceeded 11 billion kilometres and was growing steadily except for 2020, when it decreased due to the restrictions imposed to combat the COVID-19 pandemic. Still, the fleet mileage was not increasing proportionally to the growth in the number of vehicles, which implies that cars spent more and more time standing still. Passenger cars move for approximately 5% of the time, spending the rest of the time in a parking spot, looking for a parking spot or standing still.

In the freight road transport sector, the fierce pan-European competition of freight service providers makes it extremely difficult for transport companies to make substantial investments in electric trucks costing over 300,000 euros provided that the price of a truck using fossil fuels lies between 100,000 and 150,000 euros. Although the use of electric trucks powered with electricity from renewable sources would decrease the carbon dioxide footprint by up to 99%, it will not pay off the investment at the initial stage if the annual mileage is below 100,000 km. In addition to the price, other challenges include the absence of an adequate charging infrastructure.
Therefore, in the short term, it could be more profitable for freight carriers to use biodiesel, HVO or biomethane in the form of CNG or LNG. Although the carrier will not have to replace the vehicles in order to start using biodiesel or HVO, its much higher cost compared to regular diesel fuel (0.2–0.25 euro per litre) is unfortunately the chief obstacle. The CO_2 emission footprint of the trucks running on CNG or LNG biomethane is up to 90% lower than of the vehicles using fossil diesel, but installing a CNG

tank adds 15,000 euros to the cost of the truck, and an LNG tank costs 30,000 euros.

The main challenge in the sector of railway transport is the railway infrastructure throughput capacity in certain directions, which does not allow speed to be increased and will be one of the main issues if traffic were to become denser. For the number of travellers opting for trains to increase, the development of a better integrated public transport network and timetabling. Travel by train needs to become more attractive and better accessible in the areas with the highest potential. Faster trips, smoother connections between lines, linking train travel with the rest of the transport system, greater reliability, more direct lines, more intuitive and even timetables, higher frequency of passenger trains at peak times while ensuring the throughput of freight trains during the day.
The greatest challenge for freight railway transport is the replacement of diesel locomotives with new technologies in the current situation where domestic freight transport is unprofitable and operation in this field does not yield sufficient financial capacity for purchasing new locomotives. This, in turn, forces carriers to use old locomotives for freight services to ensure the price of rail transport is attractive for clients.
Another issue is the volume of investments required for the electrification of the railways, construction works to steep curves, which is necessary for increasing train speed, and the replacement of the signalling system necessary to ensure safety.

The main challenge in the sector of maritime transport is the wider use of alternative fuels. The fuel needs to be chosen in accordance with the vessel's area of operation and the existing infrastructure there as well as the availability of the required amount of the fuel. Due to the multitude of choices, the technology being at a relatively early stage of development, and sometimes the lack of the relevant laws and regulations, ship owners are waiting for the engines suitable for their vessels to enter the market and for the advantages and disadvantages of certain types of fuel to be clearly determined. The choices include methanol, ammonia, hydrogen, and electricity.
The abundance of marine fuel types must also be taken into consideration as far as ports and their investment in infrastructure are concerned. Another challenge presents itself in the form of fuel bunkering facilities and connections, for which no international standards exist, which means not every vessel will be able to bunker the fuel it needs in any port because there might not be the required fuel loading connection. The development of a uniform standard will significantly contribute to the training of specialists for handling various fuels and to ensuring safety. Finally, it is difficult to foresee the numbers of ships such infrastructures should be able to bunker.

The greatest challenge in air transport is also the use of alternative fuels. Because flight requires a lot of energy, fuels of high calorific value must be used in order to avoid adding too much weight to the aircraft. Consequently, sustainable aviation fuels with lower carbon dioxide emissions are important to reduce the carbon footprint of air transport, but such fuels accounted for less than 0.1% of aviation fuel consumption in the world in 2018.
The aviation fuels of the future are hydrogen and electricity, but hydrogen-powered aircraft may not enter the market until 2035, and forecasts do not predict their wider use until 2050. Small electric aircraft that can carry up to 30 passengers are expected to enter the market by 2030 and to operate on short-distance flights connecting regional airports, after which their capacity and flight distance are expected to be gradually increasing.
Another challenge lies in reducing carbon dioxide emissions through standardized and EU-regulated approach and take-off procedures. These procedures will allow fuel consumption and the resulting

emissions to be standardized and the noise level to be reduced. Fuel can also be saved during air travel by reaching and maintaining a certain altitude. There are airports in Europe that have made or are about to make certain approach and take-off procedures mandatory, and the European Union is developing regulations for such procedures, which, combined with free route airspace, will allow aviation to become more environmentally friendly as a whole.

ENVIRONMENTAL IMPACT OF THE TRANSPORT SECTOR

In accordance with the Effort Sharing Decision(1) by the European Commission, greenhouse gas reporting falls into the emissions of the non-ETS and ETS sectors. Non-ETS emissions comprise buildings, agriculture, waste management, and transport (except for international air and marine transport) while ETS emissions comprise the power industry, manufacturing industry, and international air and marine transport. As the ETS sector is a single market-based trading system, goals for the member states have only been set in the non-ETS sector, i.e. the national greenhouse gas inventory, which is also the basis of the calculations for this roadmap. Still, in order to give a broader overview, we provide commentary on the international air and maritime transport sector whose environmental impact is multiples higher than that of domestic activities.

2019 is chosen as the baseline year (the ordinary state of the economy before the crises), and the figures also cover the carbon dioxide equivalent, i.e., data concerning methane (CH_4) and nitrous oxide have been taken into account and adjusted in accordance with analytics guidelines. The emissions of the transport sector according to the Estonian national greenhouse gas inventory accounted for 2388 kilotonnes of carbon dioxide (16% of the country's total emissions), and most of these were generated by road transport, which is calculated on the basis of the fuels refilled on the territory of Estonia. It must be emphasized once again that the national greenhouse gas inventory only takes the domestic share of air and maritime transport into account.

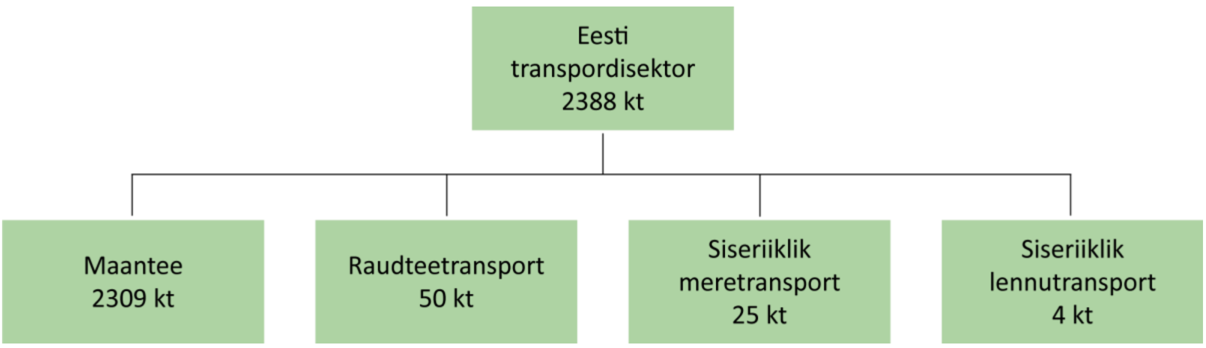

Figure 2. Distribution of greenhouse gas emissions in the Estonian transport sector in 2019 based on the national greenhouse gas inventory. *Source: Kasvuhoonegaaside inventuur (Greenhouse gas inventory).*

Eesti transpordisektor	Estonian transport sector 2388 kilotonnes
Manatee	Road transport 2309 kilotonnes
Raudteetransport	Railway transport 50 kilotonnes
Siseriiklik meretansport	Domestic maritime transport 25 kilotonnes
Siseriiklik lennutransport	Domestic air transport 4 kilotonnes

Of the emissions generated by road transport, nearly 70% come from passenger transport, and 30%, from freight transport. In its turn, the emissions from passenger cars account for 90% passenger transport emissions and 2/3 of the national greenhouse gas inventory.

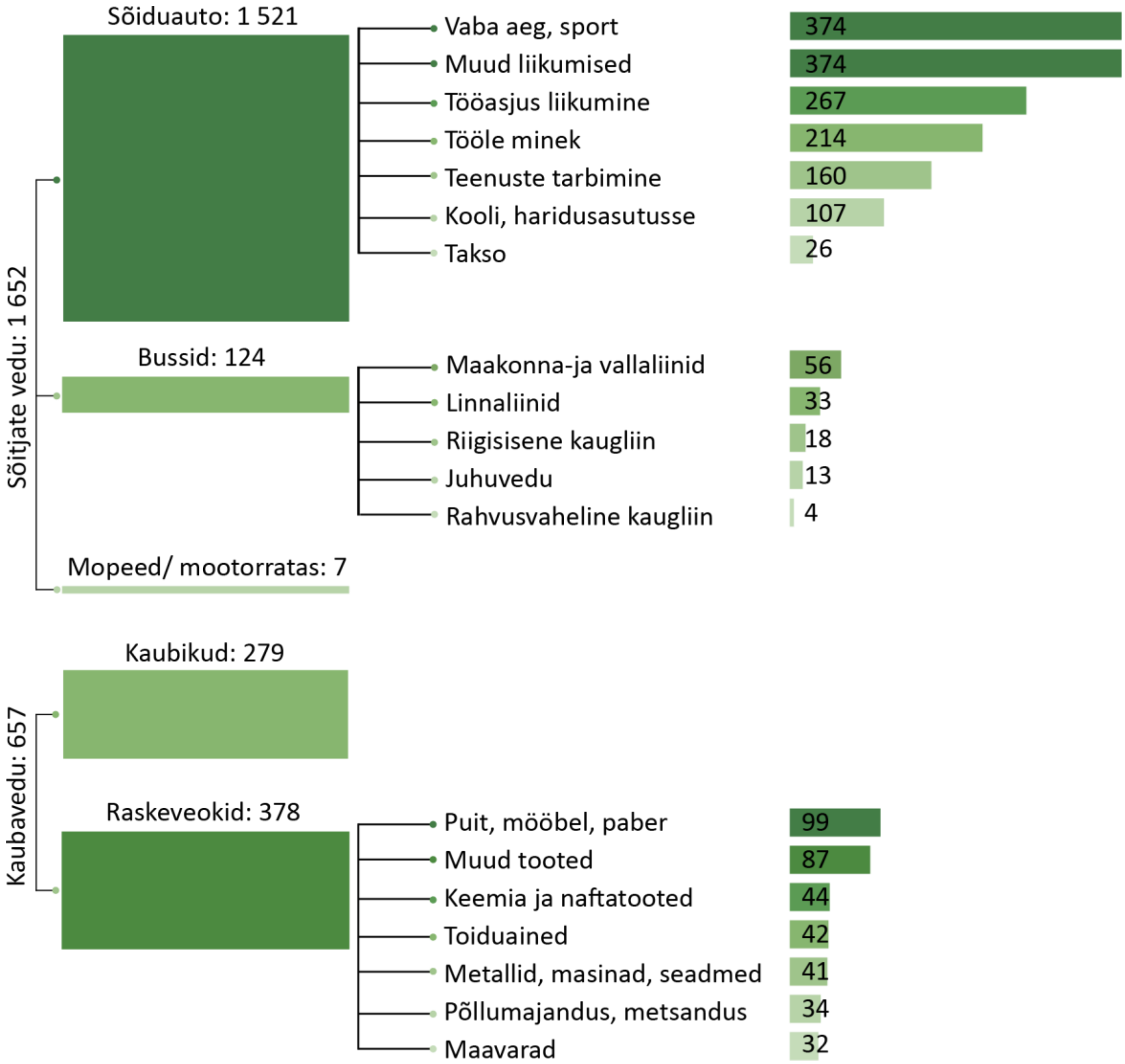

Figure 3. Carbon dioxide equivalent of road transport broken down by transport types and purposes, kilotons of carbon dioxide equivalent per year.
Source: researched by the authors.

Kaubavedu: 657	Freight transport
Sõitjate vedu: 1652	Passenger transport
Sõiduauto: 1521	Cars
Bussid: 124	Buses
Mopeed / mootorratas: 7	Scooters / motorcycles
Kaubikud: 279	Vans
Raskeveokid: 378	Heavy trucks
Vaba aeg, sport	Leisure, sport
Muud liikumised	Other travel
Tööasjus liikumine	Work-related travel
Tööle minek	Going to work

Teenuste tarbimine	Using services
Kooli, haridusasutusse	Going to school or other educational facility
Takso	Taxi
Maakonna- ja vallaliinid	County and municipal district routes
Linnaliinid	Urban routes
Riigisisene kaugliin	Domestic long-distance routes
Juhuvedu	Specialist bus services
Rahvusvaheline kaugliin	International long-distance routes
Puit, mööbel, paber	Wood, furniture, paper
Muud tooted	Other goods
Keemia ja naftatooted	Chemicals and petroleum products
Toiduained	Food products
Metallid, masinad, seadmed	Metals, machines, equipment
Põllumajandus, metsandus	Agriculture, forestry
Maavarad	Mineral resources

The emissions of railway transport account for 50.2 kilotons in carbon dioxide equivalent. The data provided by the railway operators Estonian Railways and Elron state that electric trains have been 100% powered by electricity from renewable sources since 2021, so greenhouse gas emissions are generated by diesel trains and diesel locomotives. In 2019, approximately 70% of the carbon dioxide equivalent attributed to railway transport were the emissions generated by freight transport, and 30% were generated by passenger transport, but it should be noted that the national greenhouse gas inventory of 2019 also included a significant amount of emissions from transit freight transport (constituting 65% of freight transport and more than 40% of all the railway emissions), which essentially stopped by the time of the preparation of this roadmap, so current greenhouse gas emissions from freight railway transport are in the same range as those from passenger transport.

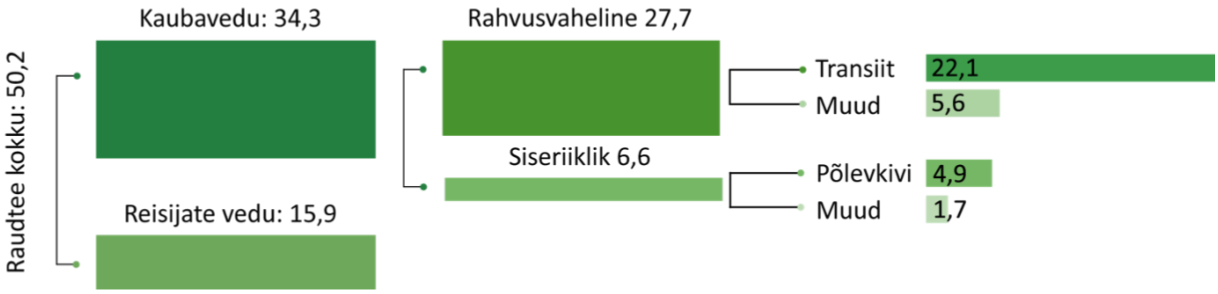

Figure 4. Carbon dioxide equivalent of railway transport broken down by transport types and purposes, kilotonnes of carbon dioxide equivalent per year. *Source: researched by the authors.*

Raudtee kokku: 50,2	Total railway transport: 50.2
Kaubavedu: 34,3	Freight transport: 34.3
Reisijate vedu: 15,9	Passenger transport: 15.9
Rahvusvaheline 27,7	International 27.7
Siseriiklik 6,6	Domestic 6.6
Transit 22,1	Transit 22.1
Muud 5,6	Other 5.6
Põlevkivi 4,9	Oil shale 4.9
Muud 1,7	Other 1.7

The carbon dioxide emissions of Estonian domestic maritime transport in 2019 accounted for 16.43 kilotons of carbon dioxide and 16.6 kilotons of carbon dioxide equivalent according to the national greenhouse gas inventory, but mapping shows that the actual carbon dioxide equivalent of the ferry services (major and minor islands) and tug services reviewed within the scope of the roadmap was higher during the year in question, accounting for 25.1 kilotons. It is also important to note that environmental pollution in domestic water transport is generated by pilots, icebreakers, surveillance ships and other vessels in addition to the described above, which further increases the gap between actual emission figures and the data in the national greenhouse gas inventory.

<u>kt CO2 ekv = kilotons of carbon dioxide equivalent</u>

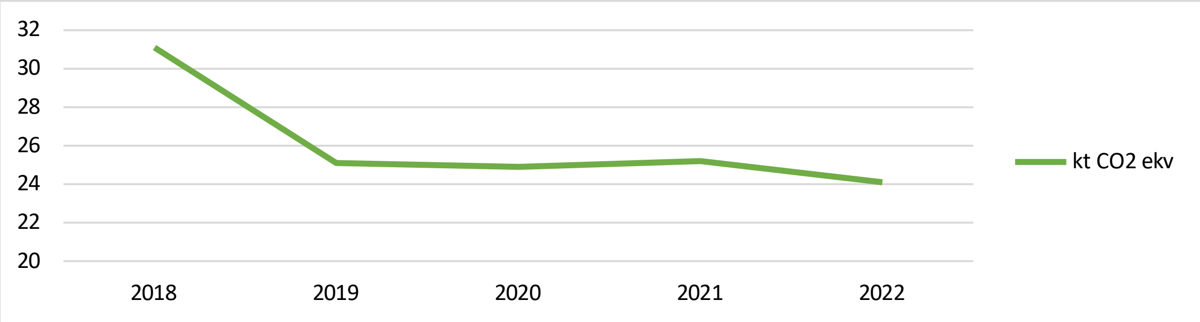

Figure 5. Carbon dioxide equivalent from Estonian domestic maritime transport in 2018-2022. *Source: researched by the authors.*

The Estonian national greenhouse gas inventory does not contain data on the fuel consumption and carbon dioxide equivalent of international maritime transport in Estonian waters, which is why there is no comprehensive picture of the carbon dioxide equivalent generated in Estonian waters or emitted by shipping lines associated with Estonia. Shipping companies operating on international routes are required to report their footprint in the EU-MRV information system established by the European Commission, and the reporting covers the emissions generated by ships at sea and at the quay burning fuel, but the system cannot filter out the emissions generated in Estonian waters. To estimate the emissions from the so called daily international regular shipping routes discussed for the purposes of this roadmap, it can be said that the total annual carbon dioxide equivalent emitted on Tallinn-Helsinki, Muuga-Vuosaari, Tallinn-Stockholm and Paldiski-Kapellskär routes (regardless of the country) ranged between 500 and 600 kilotons in the past five years. In addition, the total emissions of international maritime transport in the aquatory of the Port of Tallinn (Old City Harbour, Muuga Harbour, Paldiski South Harbour and a limited area of Saaremaa Harbour) accounted for 50 kilotons in 2019.

The emissions of Estonian domestic air transport in carbon dioxide equivalent accounted for 3.92 kilotons. The largest share, 90%, comprises passenger flights with scheduled flights as the largest source of emissions (86%) and charter flights accounting for a small share of emissions (14%).

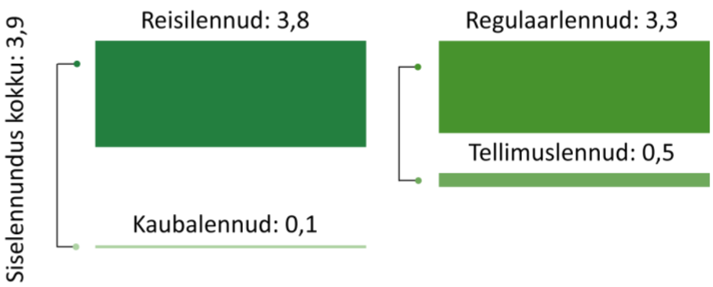

Figure 6. Carbon dioxide equivalent of air transport broken down by transport types and purposes, kilotons of carbon dioxide equivalent per year. *Source: researched by the authors.*

Siselennundus kokku: 3,9	Total domestic air transport: 3.9
Reisilennud: 3,8	Passenger flights: 3.8
Kaubalennud: 0,1	Cargo flights: 0.1
Regulaarlennud: 3,3	Scheduled flights: 3.3
Tellimuslennud: 0,5	Charter flights: 0.5

The emissions of the Estonian air transport companies discussed for the purposes of the roadmap and operating flights outside the country ranged between 10 and 30 kilotons of carbon dioxide equivalent in the past 5 years, following the same trends as the number of passengers. In addition, it should be noted that Tallinn Airport calculates the carbon footprint of taxing (movement on the airfield) for international air traffic. International airlines calculate their carbon footprint for the entire route, but there is no data for the airspace of specific countries.

FRAMEWORK DOCUMENTATION

The roadmap describes the international, EU and Estonian strategies, laws, rules, and regulations which have the greatest impact on the transport sector. The environmental regulations affecting the sector the most which will come into effect or manifest their impact within the period between 2024 and 2040 relevant for this roadmap are subjected to more detailed scrutiny. Across all sectors, the most important document is the European Green Deal, a set of policy initiatives proposed in 2019 to help the EU transfer to a green economy with the overarching aim of making the European Union climate neutral by 2050[(2)]. The Green Deal contains the Fit for 55 package, which is a set of specific proposed legislation to regulate transport and launch new legislative initiatives in order to introduce changes in EU regulations necessary for achieving climate goals[(3)]. In addition, the European Climate Law, which makes reaching climate neutrality a legal obligation for the EU and sees member states undertake to reduce their net greenhouse gas emissions by 55% by the year 20230 compared to the emissions in 1990, also plays an important role.

POSITIVE BASELINE SCENARIO

The first scenario analysed in the roadmap comprises all the known strategies, trends and regulations, and an optimistic view of their implementation is taken, so it is discussed as the positive baseline scenario. This forecast shows by how much we could ideally reduce our carbon footprint if all the measures currently discussed and approved were implemented in full.

In case the positive baseline scenario unfolds, the emissions of road transport (kilotons of carbon dioxide equivalent) can be reduced by 77% by the year 2040. For this to be achieved, a number of currently opposite trends need to change and the strategies adopted by the state need to be implemented, for example, a decrease in the mileage of privately owned cars with a modal shift towards sustainable travel (the use of cars as the main mode of travel will decrease by 9%, the use of public transport will increase by 8%, and the use of two-wheeled personal vehicles will increase by 11%) and an increase in the average number of people transported by a car (from 1.3 to 1.4). Various EU regulations which should significantly reduce the emissions from the fleet of road transport are also taken into account.

With the scenario parameters taken into consideration, the emissions from railway transport will be reduced by 66% by the year 2040. Railway passenger transport will be largely electric, but diesel fuel will still be used for freight trains (except for Rail Baltica) unless additional measures are taken. An important milestone of the completion of Rail Baltica in 2030 and its further development in synergy with the rest of the railway network is also taken into account.

The emissions from domestic maritime transport discussed within the scope of the roadmap will be reduced by 59%. As far as routes to major islands are concerned, vessels on the Saaremaa line will have become electric by 2030, and the required investments in the port infrastructure and power network will have been made, but the Hiiumaa line will continue operating diesel-powered ships due to a lack of financing for investments. There is currently no confirmed data concerning the government's intention to invest in changing ferries on the routes to small islands to electricity-powered ships, so the forecast implies they will remain diesel-powered.

The emissions from domestic air transport will be reduced by 21%, which is marginal in absolute amount. Under the ReFuelEU aviation initiative by the European Commission, the share of sustainable aviation fuels is to reach 34% by 2040. According to the baseline scenario, it is not until 2030 that relatively new aircraft (manufactured after 2020) will be purchased for the fleet in Estonia. By 2040, the passenger aircraft fleet will have received 10 new planes, i.e. one new aircraft per year will be purchased on average.

INTERVENTION SCENARIO OR TRANSPORT SECTOR VISION 2040

The intervention scenario analyses to what extent the Estonian transport sector needs to change in comparison to the positive baseline scenario so that the 90% reduction in carbon dioxide equivalent adopted as the goal of this roadmap can be achieved. The calculations made so far aim to show how great a reduction can be achieved with all the known measures taken into consideration, but the roadmap, on the contrary, aims to illustrate the extent of the changes that are necessary to achieve the goal.

The roadmap describes the development of the passenger and freight transport, the potential reduction in greenhouse gas emissions depending on the mode of transport, the appropriate changes in the fleet, and the necessary changes in the transport infrastructure.

Passenger transport and mobility

The overall situation in passenger transport and mobility in 2040 greatly depends on how people's personal travel preferences change. Approximately 2/3 of the emissions in the Estonian transport sector is generated by cars, and the decrease in the dependence on cars needs to be achieved by means of developing alternative options. The options may include using public transport, bicycles or walking, and the measures to support the modal shift should primarily target urban areas because replacing a car in sparsely populated areas is more complicated. However, for people's mentality and habits to change, the impact of increasing private car ownership and use needs to be recognized and emphasized in the context of the cost, safety, spatial planning and other aspects in addition to direct greenhouse gas emissions. Among other things, the choice in favour of active modes of travel greatly depends on the availability of the necessary infrastructure as well as the convenience and speed of the route as a whole.

Across Estonia, the share of travel by car needs to decrease to approximately 45% from the current 58% while the use of public transport is to increase to 21% from today's 9%; the share of walking may remain the same at 27%, and the share of scooters, bicycles, etc. needs to increase to 8% from 6%. Such changes imply major shifts in people's travel patterns, which are to be fostered by public transport changing in a way that would make it faster than travel by car. The frequency and comfort level of public transport needs to increase as well. Changes in taxes, including the vehicle tax to be implemented starting in 2025, policy decisions (excise taxes, ETS, VAT) and the impending increase in fuel prices will have an impact on people giving up personal vehicles. The modal shift in modes of travel seems achievable if public transport options are purposefully improved at the same time.

The trend of increasing private car ownership needs to be halted so that households would refrain from owning a second or third car. The remaining car rides need to become more efficient, i.e., the average number of people transported by a car needs to increase to 1.7 from the current 1.3.

The mileage of buses is to reach 224 million kilometres, and the growth is to be achieved through increasing the density of the route network and the number of buses as people will be choosing buses over personal cars more often.

According to Elron's forecasts, 20 million people will be using Elron's services in 2040 as opposed to 8 million in 2019, and 2.3 million passengers will be using Rail Baltica, of whom 70% will be former car users, 20% former bus transport users, and 10%, new passengers.

An increase in the number of passengers on domestic ferry routes is expected proportionally to the growth in domestic tourism, which is 3.2 million passengers in 2040 as opposed to 2.6 million in 2019. The number of journeys will also increase from the current 16,733 to 19,493.

Domestic flights will still fall into scheduled and charter flights. Proportionally to the growth in domestic tourism, the number of passengers on scheduled domestic flights will increase from 32, 498 to 101,719.

Freight transport

The transportation of goods is directly connected to production, agriculture and trade and correlates strongly with the general development of the economy. The forecast market size depends, among other things, on whether the trend of nearshoring is manifested and on the resulting growth of trade within the EU. In addition, it should be noted that Estonia alone plays a modest role in decarbonizing the freight transport sector, which is why cooperation with other participants of the logistics chain in the neighbouring countries is important. It is clear though that choosing the mode of freight transport will more and more often imply that its environmental footprint needs to be taken into account alongside its price and speed, and preference needs to be given to those modes of transport appropriate for the type of goods, the route and the required speed that have lowest carbon dioxide emissions per tonne-kilometre.

The forecast model in the roadmap is based on the assumption that the amount of goods transported by light trucks in the sector of road transport in 2040 will remain the same as in 2029, and the annual mileage of the relevant fleet will comprise 1439 million km. As far as heavy trucks are concerned, the expected increase in tonnage per truck and decrease in the mileage of the vehicle fleet will both have a positive environmental impact. The increase of the amount of cargo from the current 13.6 tonnes to 15.16 tonnes per vehicle will be achieved by means of longer and heavier road trains, which will result in reducing the number of the heavy trucks in use. Decreasing the mileage of the fleet from the current 357 million to 244 million kilometres is to result primarily from redirecting freight transportation to Rail Baltica.

In railway transport, freight turnover will increase from 2160 million net tonne-kilometres in 2019 to 3331 million net tonne-kilometres, primarily resulting from the impact of Rail Baltica and redirecting cargo from road transport to the railway, i.e., the modal shift. In 2030, the infrastructure of Rail Baltica is expected to be used for transporting 5.1 million tonnes of goods, and the corresponding freight turnover will constitute 1744 million net tonne-kilometres, of which 30% will be new cargo, and 70% will be redirected from road transport. The annual increase in cargo amounts is forecast at 1.6%, reaching 6 million tonnes and 2044 million net tonne-kilometres by the year 2040. It is important to note that approximately 3000 heavy trucks per day now cross the border between Estonia and Latvia, carrying on average 13 tonnes of goods, which amounts to 14 million tonnes per year.

No significant increase in trade is forecast for domestic maritime and air transport.

To sum up, one of the most important issues concerning the volume of goods in the freight transport sector is whether the modal shift from road transport to the railway (and international maritime transport) will take place in order to reduce the emissions from and the environmental impact of road transport and to transport goods more efficiently. In doing so, it is vital to consider for which routes and cargo groups the modal shift is rational and justified; for example, Estonian domestic distances are often too short while the urgency and time pressure make the use of the railway unreasonable. The following bottlenecks need to be addressed for an optimal modal shift:

- international cooperation with the other participants of the supply chain to direct the transit passing through Estonia from roads to the railway (on its own, Estonia's role in this process is limited);
- increasing railway capacity: optimum routes and connections, sufficient fleet and equipment, cargo loading platforms, transportation speed and flexibility, competitive prices;
- ensuring sufficient throughput capacity for railway freight transport when passenger railway traffic increases substantially at the same time (approximately 20 million passengers by 2040);
- changing to electricity-powered railway transport should not make it more expensive than freight transport by road or, vice versa, artificially make road transport more expensive;
- analyse options for financing the maintenance of freight carriers' rolling stock when the volume of freight traffic is low, and goods are transported by Rail Baltica and the existing 1520 mm gauge infrastructure.

PROPOSALS FOR CHANGES

As the goal is to substantially reduce the emission of greenhouse gases in the Estonian transport sector, proposals with the greatest impact and highest priority are presented, broken down by segments within the transport sector. If implemented, these changes would make a gradual transition towards an economic model that is in harmony with nature possible. For each proposal, the roadmap provides the description of its content, impact, timeframe, and cost.

The most important proposals in the passenger transport and mobility segment pertain to the development of public transport and active modes of travel as well as achieving the modal shift from the use of personal cars to alternative modes of travel. The emissions from cars amount 65% of all the emissions in the transport sector, according to the national greenhouse gas inventory, and as the largest share of travel by car takes place in urban areas, these are the ones to be targeted by the necessary measures. The increase in private car ownership needs to be halted, the public transport network (buses, trams, trains) needs development, and priority needs to be given to pedestrians, cyclers, and users of other active modes of travel.

In the freight transport segment, priorities comprise the introduction and broader use of alternative fuels as well as the provision of the necessary charging or loading infrastructure. Due to the competition in international transport services, the sector needs support in reducing greenhouse gas emissions while major changes require international cooperation, for example, directing freight transport to Rail Baltica from its current transit corridor.

In addition, attention needs to be paid to upgrading Estonia's existing power network for better consumer connection. Power network capacity for new connections is running out, especially so in large urban areas although this is also true for the rest of the country. Apart from adding robustness to the power network, new smart solutions are needed for network resource optimization, namely, ensuring that consumers (chargers) have access to greater capacity when the network has the resource but it is reserved for non-consumers.

ROAD TRANSPORT – PASSENGER TRANSPORT AND MOBILITY

Measure	Explanation
Mobility hubs for multiple transport modes	Creating district mobility hubs that connect a variety of transport modes and Park&Ride options.
Fast bus connections between major centres	Implementing integrated public transport scheduling for the synergy of various modes of transport and creating hubs between major centres in all the counties to increase the speed of public transport compared to travelling by car. Introducing express bus routes in cities and towns.
Public transport lanes and priority in Tallinn and Tartu	Further separation of public transport from the rest of the traffic to increase its speed and, consequently, competitive advantage.
Increase in car sharing	Increasing the number of people transported by a car to an average of 1.7 per car. Planning for shared mobility and shared driving.
Implementing the vehicle tax on the basis of actual use	Collecting the taxes for a shorter period than a year (paying the annual tax in advance could lower the motivation to choose environmentally friendlier modes of transport on a daily basis); introducing location-specific mileage taxation (targeting the areas with more alternative travel options (urban areas) by tax collection).
Lowering the speed limit on secondary and local roads	Lowering the speed limit to 80 km/h, which contributes to road safety and saving fuel.
Rail transport development in Tallinn urban area	Selecting specific tram routes on the basis of a number of analyses and starting the construction.
Land use and spatial planning with regard to mobility	Implementing the MaaS principle in the land use and space use in cities and their larger urban zones, which implies fast and easily accessible public transport connections, travel on foot and by bicycle, and micro-mobility options (electric scooters and e-bikes).
Smart home chargers for electric cars	Supporting electric car owners in purchasing smart chargers to be used as a balancing asset in the power system regulation market.
Bicycle purchase aid	Aid for purchasing an e-bike or other means of active travel.

ROAD TRANSPORT - FREIGHT TRANSPORT

Measure	Explanation
Allowing longer and heavier road trains	Increasing the tonnage to 60 tonnes and the road train length to 25.25 metres by the year 2025 and by 34.5 metres by the year 2030, which will allow more cargo to be transported with fewer heavy trucks and drivers.
Aid for purchasing trucks powered by biomethane or electric trucks	Aid for the use of gas-fuelled and electric trucks in domestic freight transport; aid for purchasing electric trucks with a logistics centre and depot loading.
Giving preference to environmentally friendlier vehicles in public procurements	Clear preference for renewable fuels and EURO VI trucks in public procurements for road construction, State Real Estate projects, and transport services for state-owned companies.
Updating the truck fleet with EURO VI trucks and trucks using renewable fuels	Financing for the upgrade of the local truck fleet from EURO 0-V emission class to EURO VI, exemption from the road use fee and heavy truck tax for electric and gas-fuelled trucks, and fee differentiation for trucks with internal combustion engines on the basis of their EURO emission class.
Developing the loading infrastructure for heavy trucks	Reverse auctions (similar to reverse auctions for renewable energy development) organized by the state for the construction of the loading infrastructure in strategic locations.

RAILWAY TRANSPORT

Measure	Explanation
Introducing battery-powered passenger trains	Retrofitting 16 trains of the Elron’s rolling stock of 20 diesel locomotives to be powered by battery units so that the trains can go on battery power after they leave the area where the electric infrastructure is available.
Smart scheduling	Implementing integrated public transport scheduling for the synergy of various modes of transport and creating hubs where public transport vehicles gather every hour, creating an integrated public transport network.
Replacing diesel locomotives with locomotives powered by alternative fuels	Financing the purchase of environmentally friendlier locomotives or upgrading available locomotives for cargo carriers to start using hydrogen, gas or electricity instead of diesel fuel.
Developing the ‘North to South’ transport corridor	Signing a strategic commercial agreement; actual cooperation with other countries from Finland to Poland for promoting railway transport.

MARITIME TRANSPORT

Measure	Explanation
Upgrading domestic ferries to be powered by electricity	Upgrading the vessels to be battery-powered, constructing shore charging facilities and using green hydrogen as an alternative supplementary fuel.
Introducing automatic mooring devices	Investing in automatic mooring devices for the ports that service domestic ferry routes to reduce the ports' greenhouse gas emissions.
Encouragement of green solutions by the state	Encouraging the sector to opt for reducing its environmental footprint through public procurements and projects (for instance, public procurement of ferry operations).
Developing a green hydrogen supply chain for supplying ferries with an alternative fuel	Development of an alternative infrastructure by the state in the ports that service domestic ferry routes.
Developing an information exchange platform	Digitizing the information exchange between the parties involved in the vessel's port visit (operating company, agent, pilot, tug, etc.) and making the information available in real time to prevent the waste of resources in case of changes.
Using the ETS funds for the green transition in shipping	Allocating the fees collected through the ETS system back to the shipping industry so that ship owners can use the funds for investments to reduce emissions or change to emission-free fuels

AIR TRANSPORT

Measure	Explanation
Developing and securing a supply chain for sustainable aviation fuels	Supporting the use of sustainable aviation fuels on domestic flights. Developing domestic production capacity to ensure that the required fuel is available on the domestic market.
Developing air traffic control	Extending the free route airspace to Northern Europe. Creating a system for the organization of air traffic across national borders and ensuring the ability to provide services. Implementing remote and complex ATC towers.
Investing in newer and more fuel-efficient aircraft	Investing in the fleet for more efficient fuel use and lower maintenance and repair costs.
Flexibility in organizing domestic flights	Including the principle of seasonal seating capacity in the public procurements for air transport operators to organize air traffic on Estonian islands to ensure that the service is available to tourists and local users in the summer and reduce the share of low-occupancy trips in the winter.

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