

ROADMAP FOR FOSSIL
FREE COMPETITIVENESS

Haulage industry



THE SWEDISH ASSOCIATION OF
ROAD TRANSPORT COMPANIES



A decarbonized and competitive haulage industry by 2045



Foreword

Sweden will be one of the first fossil free nations. The road to get there includes creating more jobs, a better life for the population and increased competitiveness for companies. This is not just a vision but a firm reality, with several business sectors now presenting their roadmaps for fossil free competitiveness.

This work is crucial in a time when greenhouse gas emissions are decreasing far too slowly to limit global warming to 1.5 degrees Celsius. It is the task of the Fossil Free Sweden initiative to accelerate Sweden's climate mitigation and adaptation efforts, and it has therefore invited business sectors to develop their own roadmaps for fossil free competitiveness to show how they can contribute to a fossil free future, how they improve their own and their customers' business and how it strengthens the competitiveness of Sweden. The response has been overwhelming. In total, thirteen roadmaps have been handed over to the government, and more will be launched.

These roadmaps are unique initiatives. The fact that various corporate networks show how they can contribute to a fossil free future is certainly a good thing, but entire sectors drawing up their own roadmaps for being fossil free by 2045 is an initiative that brings hope for the future. It is not just the actual document that is important, but also the fact that it has entailed a far-reaching process involving many other players through various workshops and seminars. Since there are so many roadmaps, producing them creates a momentum in Sweden, with more and more players taking steps towards being fossil free.

These roadmaps jointly make up a 'Jigsaw Puzzle of Sweden', showing how Sweden can become fossil free while welfare increases. The sectors are owners of their own roadmaps, and of the policy demands necessary to realize their ambitions. Fossil Free Sweden has worked with the sectors in various ways to support them in developing their roadmaps. This has included joint storytelling and communication, participation in workshops, and occasionally giving concrete suggestions and advi-

ce. It should however be emphasized that the roadmaps are products of the inherent drive and commitment of the sectors, and that the results and the various political suggestions highlighted are owned by the sectors themselves.

Through these roadmaps a Swedish national team for fossil free development has been created. It has come together to show others that another world is possible. When we demonstrate that a fossil free country is also the way to a better life, there will be a global race to leave the fossil based society.



Svante Axelsson

National coordinator, Fossil Free Sweden

Contents

1. Introduction	8
Road transports of goods in Sweden	9
Goals and target date	9
Vision	9
About the roadmap	11
2. Current situation	13
Distances and goods type	15
An integrated international market	15
3. Trends	16
Truck transports increase	16
Renewable fuels	17
Intermodal transports	18
Digitization	19
High capacity vehicles	20
Fair Transport	20
4. Commitments	22
Energy	23
Technological development	23
Efficiency	23
5. Policy suggestions and analysis	24
Energy	25
Efficiency	26
Competition	28
6. References	32

1. Introduction



The road transport industry's roadmap for a fossil free Sweden aims at identifying progressive and ambitious, yet growth-oriented policies in strengthening the competitiveness of Swedish haulers while they become fossil free.

The roadmap serves as a knowledge base and information to the government, and in inventory of the work already achieved in minimizing emissions. The report is part of the government initiative Fossil Free Sweden and the project Fossil Free Competitiveness. The national target for net zero emissions is year 2045.

This report aims at outlining the development for how road haulage companies compete internationally and nationally when ambitious climate policy is in place. In short, how is sustainable development achieved in the road transport sector, and which are the necessary poli-

“How is sustainable development achieved in the road transport sector, and which are the necessary political decisions that bring society and road transports to zero emissions?”

tical decisions that bring society and road transports to zero emissions?

The report aligns with Swedish climate policy and thus uses year 2045 as the final deadline at which point Sweden is climate neutral. The challenge lies in that road transports in as little as 26 years (this being written in 2019) should be completely free of fossil fuels while transports is expected to increase by almost 40 percent.

Transports is a driving force and a prerequisite for many other industries, and thus this roadmap is closely related to several other industry roadmaps.

ROAD TRANSPORTS OF GOODS IN SWEDEN

Sweden, a sparsely populated country with vast landscapes and long distances, has a well-developed road infrastructure. Our regulations in weights and dimensions reflect this, as they allow longer and heavier trucks than the European average. Reducing emissions includes making road transport as effective and efficient as possible; and transporting as much as possible in each run is smart. The logic works for reducing emissions and costs alike, which is reflected in the fact that transport intensive industries use such as forestry uses longer and heavier vehicles to reduce the climate impact of transport.

An efficient transport system should, despite long distances, minimize traffic while reducing empty loads; thus maximizing the amount of goods in each run and enabling, where possible, the usage of other transport modes.

Another unique condition for Sweden is the size and scope of the bio economy. Forestry and agriculture constitute 11,3 percent of the national gross domestic product, and little more than a fifth of exports. 350 000 people are employed in the bio economy sector, equaling seven percent of the total workforce.¹ Hence the debate on extracting resources and using waste, residue and byproducts from forestry and agriculture in producing biofuels is distinctly different and more positive than in the rest of the EU. The emission reductions achieved are almost solely due to renewable biofuels, and specifically for the road transport due to HVO (hydrogenated vegetable oil), a synthetic renewable diesel fuel. Scaling up the sustainable production of biofuels using natural and

renewable resources has been and will continue to be an important corner stone in Swedish climate policy.

GOALS AND TARGET DATE

The parliament decided that greenhouse gas emissions from domestic transports are to be reduced with 70 percent by 2030 compared to 2010. By 2045, Sweden is to have net zero emissions of greenhouse gases.

2030 -> at least 70 percent lower emissions from heavy road transports compared to 2010 will be achieved predominately with renewable diesel



2045 -> Fossil free heavy road transports will be achieved with new and renewable fuels, electrification, biogas and optimized logistics

Heavy road transports will be fossil free by 2045, and possibly sooner

The vision is based on the assumption that Sweden will reach the overall climate target of net zero emissions by 2045. The political will creates a favorable climate for innovation of new technologies and fuels. People have adjusted their behavior and consumption patterns, and a sustainable way of life is norm for people and society. The transport system of 2045 is seamless, interconnected and flexible. The intricate pattern of roads tie intermodal terminals with industry sites, enterprises, businesses and citizens. Long haul transports begin and end with trucks in combination with sea and rail.

Heavy duty vehicles are optimized and thus varied and specialized for the given transport operation. Fossil free diesel power the heaviest vehicle combinations, electric roads connect terminal areas and ports, and light electric trucks caters for distribution in the cities. Food and forest waste based biogas power many of the regional transports.

In 2045, a high degree of automation makes road transports more efficient. Haulers, transport companies, are logistics experts offering holistic solutions rather than “simply” transports. Intelligent transport systems and e-commerce makes life in rural areas an attractive alternative to dense urban living. Deliveries arrive at your doorstep with light vehicles and drones. Cities are plan-



ned with logistics in mind, providing smart solutions for the rapid increase in just in time deliveries of just about anything.

70 percent lower emissions of greenhouse gases from heavy duty vehicles in 2030 compared to 2010

Whether the milestone of 2030 is achievable, and what measures needs to be taken in doing so, is difficult to assess. Whether the growth in transportation will increase with more than 40 percent is uncertain, and the distribution of that growth over the different transport modes is uncertain. In addition, competition from foreign transport companies is increasing. Swedish domestic haulers are subjected to policy and regulation coherent with Swedish environmental legislation, which is not always the case for foreign companies visiting for a shorter while.

Within the industry, the trust in the realization of the target for 2030 is low because the availability of fossil free fuels is uncertain. The target is attainable also for heavy duty vehicles if adequate volumes of renewable fossil free fuels are available to replace diesel. In the short perspective, leading up to 2030, fossil free substitutes to diesel are important. Gas and electrification have enormous potential with a longer time frame in mind.

About the roadmap

The road transport industry roadmap to a fossil free competitiveness is written by the Swedish Association of Road Transport Companies. The Swedish Association of Road Transport Companies is a trade organization with about 6000 member companies, who own approximately 38 000 vehicles and employ some 150 000 people.

The roadmap is limited in scope. It introduces the challenges and opportunities within the industry, cover how transport companies can work with fossil free transports, and identify the necessary political decisions that needs to be taken. Thus, important technologyu leaps, biofuel production and such is areas not included in the roadmap, since such developments lie outside of what can be considered the strategy of a transport company. The roadmap covers the areas over which transport companies influence: how we do business, how we make decisions, and how we market ourselves.

“An important point of departure is that goods transports is expected to increase within all transport modes, and that all modes need to be given favorable conditions for reducing emissions.”

Political areas of interest relate to fuel policy, technical specifications, taxation, and a level playing field on the European market.

An important point of departure taken as a given is that goods transport is expected to increase within all transport modes, and that all modes need to be given the best possible conditions for reducing emissions.

Aspects that needs further assessment is the borderline between environment and climate obligations. Most aspects that reduce greenhouse gas emissions in the road transport sector also improve environmental performance relating to for instance pollution. A major corner stone in reducing emissions is switching to a better fuel. But – had the objective been to minimize environmental impact while reducing climate emissions, some positions and considerations might have been different.

Why are we doing this?

The Swedish Association of Road Transport Companies believe that the hauler of the future need to actively work with reducing emissions. A company that does not already explore the possibilities in new fuels and technology will easily fall behind. Customer demand is only increasing, with the public sector moving fast requiring both low emission and zero emission transports. In a near future this will be the norm: even the end consu-

mer will demand climate smart transports. Consumer choices will change as awareness of the climate crisis increases. As a trade organization, it is our role to support members in identifying possible pathways and choices ahead, alongside our advocacy for achieving a level playing field and a favorable environment for profitable and responsible transport companies. The right political decisions is a prerequisite, and therefore this roadmap is needed.

Responsibility for realization

The transport companies are responsible for strategizing, continuously streamlining and reducing fuel consumption, investing in new vehicles, and adhere to all rules regarding emissions and pollutants.

Vehicle manufacturers are responsible to assure that vehicles put on the market have the latest fuel-saving and efficient technical solutions, and that vehicle innovations continue to improve.

Fuel producers and distributors have a responsibility to fulfill the legally binding reduction obligation, ensure that fuels reduce climate impact, and that the share of renewable resources increase over time. Infrastructure for new fuels is a crucial point where policy and legislation is needed.

Decision makers are in this road map handed a haulage industry-specific analysis of already proposed policies and their effect on reducing emissions from trucks, as well as suggestions to new policy. Such policies need to be long-term and stable for them to function as a prerequisite for major investments.

Further research and development in technology and business models for technical solutions is needed – for instance, for electric road, battery capacity and sustainability performance, fuel cells and hydrogen.

The Swedish Transport Administration has a responsibility to ensure that roads have adequate standards and bearing capacity for high capacity vehicles. The Transport Administration also carry out long term plans for infrastructure planning and investment and need to investigate for instance where electric roads are best suitable and how green waves can be introduced to facilitate eco-driving.

Transport buyers need to take and even greater responsibility for their transport's emissions, and thus further motivate transport companies to work proactively to do so. Following up demands in procurement processes is also key.



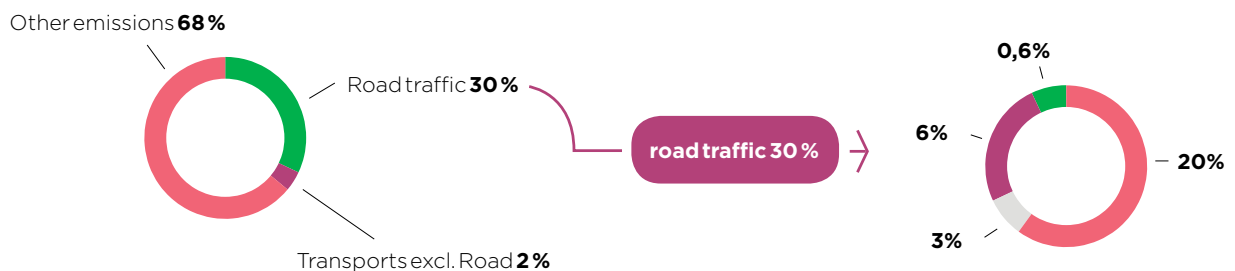
2. Current situation



Freight transport is a basis for trade, construction, industry and business throughout Sweden. Important factors in reducing emissions is switching to renewable fuels, route optimization and increasing total load and thus

maximizing the amount of goods at each run. The emission reductions in recent years are primarily due to an increased share of renewable fuels.

Heavy trucks account for six percent of Sweden's greenhouse gas emissions, and 21 percent of road traffic emissions.



● Road traffic ● Other national emissions ● Domestic transport ● Cars ● Vans and light trucks ● Heavy trucks ● Other

Data source: Naturvårdsverket rapport 6848. Fördjupad analys av svensk klimatstatistik 2018



The transport sector accounts for about one quarter of Sweden's total energy consumption. Since the 1970s the energy use and transport flow have increased parallelly. The fossil share in domestic transports has decreased from 93,4 percent in 2009 to 79 percent in 2017.³

A survey conducted in March 2018 show that the primary driving forces for transport companies to actively work towards reduced emissions is customer demand, profitability, and the desire to contribute to climate mitigation. Many companies have strategized in order to deliver fossil free transports where the solution lies in liaising with customers along the transport chain. Such operators have created a favorable environment for working with reducing emissions, where optimized routes and renewable fuels imply different planning and costs.

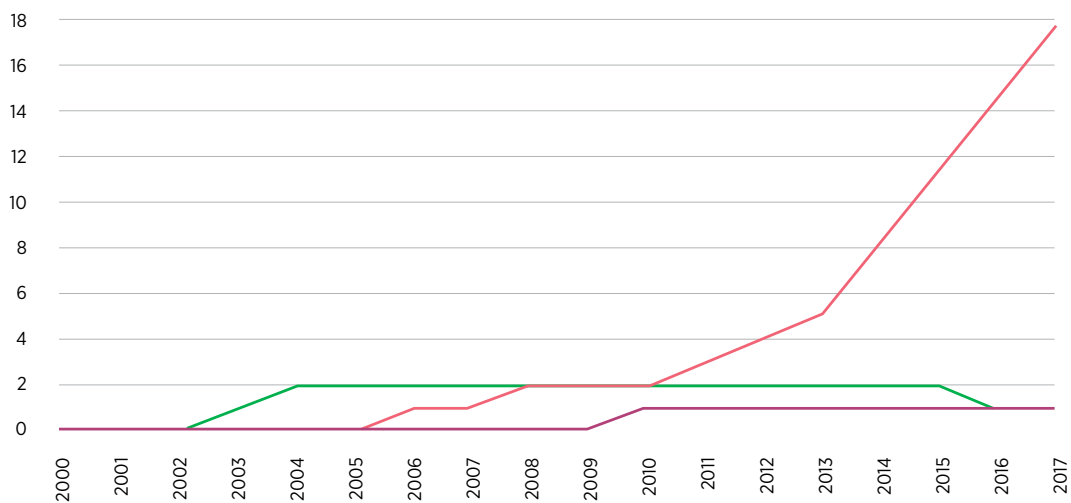
When it comes to reducing emissions of greenhouse gases, the solution as well as the challenge lies in diesel. Heavy trucks are to 97 percent powered by diesel. That dominance of fossil diesel explains the success of renewable diesels such as HVO, hydrogenated vegetable oil, which is in terms of energy equal to fossil diesel and therefore requires no changes in infrastructure or engines. Its success is therefore the reason for the recent reductions in emissions from heavy traffic. In 2017, emissions from heavy trucks was 12 percent higher than in 1990, which is explained by increasing demand for transports. Between 2010 and 2019, total transport emissions

»Many companies have carried out extensive operational changes to be able to deliver fossil-free transport, the solutions of which have been made possible through the collaboration with customers and the entire transport chain.«

have been reduced by 19 percent.⁴

In addition to renewable fuels, route optimization and effectivization of loads, eco-driving, and investing in newer more efficient vehicles are important measures.

BIOFUELS IN THE TRANSPORT SECTOR



— Bioethanol — Biodiesel — Biogas

Data source: Energimyndighetens energibalanser inhämtat av Statistiska Centralbyrån

The potential for reducing greenhouse gases with such measures is not measured on a larger aggregated scale. An example where route optimization led to substantially lower emissions is the Södertörn Cooperation, where distances were shortened with four percent by route optimization only.⁵ The figure is likely to be much higher with further streamlining of distances.

DISTANCES AND GOODS TYPE

Trucks are used for more than three quarters of the goods transporter in Sweden.⁶ Transport by truck is essentially short-range – almost 80 percent of what is transported, travel by truck on distances shorter than 500 kilometers.⁷

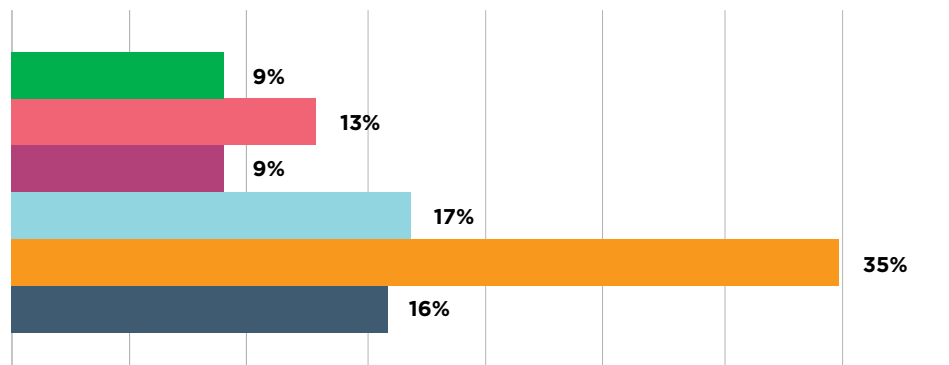
The haulage industry is very varied, and can be roughly be divided into long-distance traffic, building and construction, distribution, sanitation and forest transport. The most common commodity groups are usually ore and other extraction products; packages; and waste, biproducts and secondary raw materials.⁸

AN INTEGRATED INTERNATIONAL MARKET

After the liberalization of the European internal market, road transports are more and more international. Although the free movement is limited by a comprehensive set of rules governing among other things cabotage, posting of workers, international transports and combined traffic, there is still little to none data about truck movement across borders. In Sweden this, along a lack

of control of aforementioned regulations, create an unhealthy price competition in the transport industry. Moreover, international agreements and EU policy do not always align with Swedish policy. One example is a clear focus on intermodality and increased railroad traffic in the European context, and a strong focus on biofuels in Sweden. The prerequisites for extensively increased intermodality is limited in Sweden. This means that if a fossil free Sweden is to be achieved, action needs to be taken **within** the road transport sector, regardless of the development in other modes of transport.

SHARE OF GOODS PER DISTANCE CATEGORY



Source Trafikanalys Statistik 2017:14. Lastbilstrafik 2015, tabell 5.

● 300 kilometer and longer ● 150-299 kilometer ● 100-149 kilometer ● 50-99 kilometer ● 10-49 kilometer ● 0-9 kilometer

3. Trends

The conditions for fossil free road freight are good in Sweden. Technology development in the automotive industry and research within second and third generation biofuels contribute to a favorable environment. Political attention to climate policy and transport emissions pave the way for progressive policy.

TRUCK TRANSPORTS INCREASE

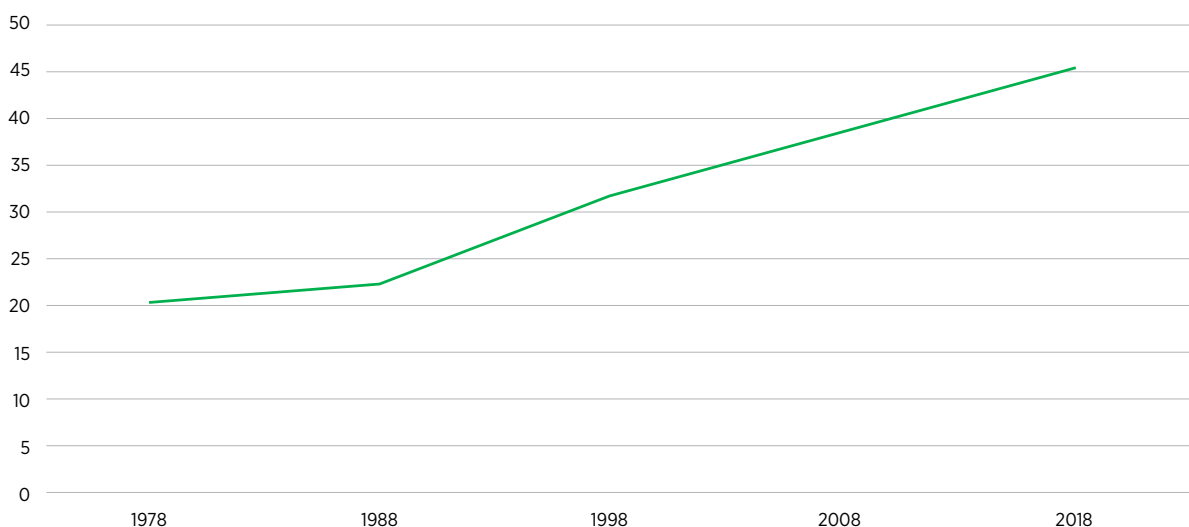
Freight transport is highly cyclical, and the boom particularly in the construction sector increase demand for transports. At the same time, the demand for transports increase steadily over time.

The Swedish Transport Administration estimate that the flow of road transport of goods will increase by 1.8 percent per year between 2012 and 2040⁹. The projections of increase in traffic and freight volumes is of great importance for the assessment of necessary measures. The more uncertainty there is, the more likely is that distribution of goods over the different transport modes will not change significantly.

Climate scenario or base scenario for future traffic flows? The Swedish Transport Administration's report Instruments and measures to minimize the greenhouse gas emissions due to the transport system

In the above-mentioned report, the Swedish Transport Administration assess the need for action based on the goal of net zero emissions by 2045 and 80 percent lower use of fossil energy in road traffic by 2030. Deficiencies in the transport sector is analyzed along with the need of measures using a back-casting model. The method assumes large scale transfer of freight volumes from road to other modes of transport.

TRUCK TRAFFIC FLOW, BILLION TON KM



— Truck traffic flow

Data source: Traffic analysis

The uncertainties associated with forecasting the increase of goods freight and distribution over transport modes create an uncertain base for forecasting emissions and traffic flow. Different authorities and research organs use different assessment of future traffic flows, thus reaching different conclusions.

Using the base scenario, the Swedish Transport Administration assume a much larger increase in traffic compared in the climate scenario. The base scenario also assume a larger increase than the Swedish Energy Agency and the Swedish Environmental Protection Agency does.

A starting point for this roadmap is that heavy road transport can increase while at the same time the goals of becoming fossil-free can be reached. The roadmap therefore does not sketch out any extensive transfer of goods to other transport modes. Thus, renewable fuels, green and fair competition and technology leaps are corner stones for the haulage industry to become fossil free.

RENEWABLE FUELS

The transport sector uses a quarter of Sweden's total energy consumption, where the fossil share has decreased from 93.4 percent in 2009 to 81.1 percent in 2016¹⁰.

The importance of each respective renewable fuel, powertrain and energy type depends, among other things, on the development of transport flow, the efficiency of vehicles and the extent to which heavy trucks can be electrified. Potential assessments of the need for energy and of each fuel are uncertain. In addition, several transport policy measures are aimed at transferring goods from road to other transport modes, and thus, forecasts in future energy needs are even more uncertain.

In a global perspective, the internal combustion engine powered by diesel needs to be replaced. This also applies to Sweden, but such a development must happen globally. There are no natural resources in the world to replace fossil fuels in volume. Diversification and specializing energy and vehicle for different transport needs is necessary. The IRU, the international road transport union, assess LNG (liquid natural gas) and hydrogen fuel cells as the most promising alternative technologies to replace fossil diesel in long-distance transports. In the Swedish context, electric roads are probably a much

more interesting alternative – which, in contrast to natural gas, can also be fossil free.

Sweden's comparative advantages in energy are obvious. Sweden is a net exporter of electricity which is largely fossil free, the viable forest industry within which more biomass can be utilized, and large agricultural areas that can be used. The prerequisites for scaling up the production of renewable fuels are, the essentially political disagreement with the EU aside, good.

Electricity

Heavy trucks powered by electricity is being developed and tested in several parallel tracks simultaneously. The development is rapid, and the observation is therefore associated with uncertainty – but post 2030, the use of electricity will significantly increase in road freight transports.

For electric motors with battery in heavy vehicles, the weight of the batteries compete with the load and weight capacity. The higher the volume and weight of a loaded truck, the lower the emissions per transported unit – but if the truck is powered by fossil free electricity, the emissions are, naturally, zero. Trucks are run in shifts as to maximize productive time, and a profit driven transport company strive to keep their vehicles stationary as little of the time as possible. Stagnant charging time then becomes a factor that affects the revenue of the entire company. Cost efficiency needs to be weighed in when assessing reduction of greenhouse gas emissions, which is why the reasoning has long been that a battery-powered truck with today's technology hardly can compete with a diesel-powered truck. In addition, trucks with lower capacity, will increase the number of vehicles using our roads. If battery-powered trucks become more common, the proportion of vehicles on the roads will increase significantly.

The perspective can however change – if there is a willingness to weigh in the stagnant time the total transport cost. A value shift in where climate neutral transports are the most important objective, the acceptance for more expensive prices and more congestion can be tolerated.

Electric road is possibly a more likely scenario in the longer term. The infrastructure and business models are still being researched and demonstrated, but they can be of great importance from 2030 and onwards. Con-

tinuous energy transfer either via airborne, terrestrial conduction or induction technologies may have commercial impact in a few years. For the heavy transports that are generally short and local, the greatest gain in electrification of road sections is primarily in recurring repeatable logistics flows. Between terminals and ports and other logistics nodes, electric roads fit particularly well from the perspective of today's truck movements and logistical markets. In the longer perspective, and, depending on the development of the traffic flow within other modes of transport, electrifying larger shares of the road network can become a very important measure to achieve zero emission transportation by 2045.

Renewable diesel

In order for heavy road transports to become independent of fossil fuels, production of renewable diesel must increase.

The use of biodiesel in trucks is divided into two categories: low-mixed biodiesel which is mixed into fossil diesel, and pure biodiesel. One explanation for the striking increase of biodiesel, from virtually zero percent to 78 percent of all renewable diesel, is the increased mixing in of renewable fuel into fossil and that the overall diesel consumption has increased.¹¹

Sweden has introduced a regulatory framework for ensuring the steady increase of renewable fuels. The reduction quota obligation was introduced in July of 2018 and aims to encourage production of renewable biofuels in Sweden. Prior to its introduction, renewable fuels were dependent on subsidies, which required a biannual approval of exemption from the rules on state aid in the Treaty of the Functioning of the European Union. Thus, the predictability that the reduction quota obligation introduces was welcome. Major investments in vehicles and production facilities for biofuels alike require stability in policy and a long-term perspective.

Sweden's conditions with large forest areas and residues from the forest industry create a possibility for scaling up production. One important question remains: how much biofuel can be produced, without risking biodiversity and competing with current provisions of biomass? The forest industry estimates that the potential for biofuels can increase from 1 to 10 TWh. This estimate, however possibly conservative, indicates that biofuels alone cannot replace diesel.

There is a great confidence among transport companies in renewable diesel, and specifically HVO (hydrogenated vegetable oil). Such fuels require no changes in engines or vehicles, meaning that HVO can be refueled when and where it is available, and otherwise standard mixed diesel can be used. The advantage is that the risk of production shutdowns due to shortage is avoided, and vehicles and routes does not need to be tailored to the availability of fuel.

Biogas

94 % of the gas fuel sold in Sweden is biogas.¹² The government has allocated substantial funds to support biogas production and the investment of gas infrastructure. The number of gas-powered heavy vehicles will increase. As of 2018, there were 920 heavy duty gas vehicles registered in Sweden,¹³ and limitations in infrastructure for refueling has been the main obstacle for transport companies to invest in gas-powered vehicles. Considering the new models presented by the automotive industry, the major investment into infrastructure, and the expansion of production and refueling sites by gas companies, biogas will be very important in reaching fossil-free road transports.

INTERMODAL TRANSPORTS

Road transport is becoming increasingly economic and safe. The road network is flexible, robust and ensuring mobility for businesses and people alike, also for those who live or work far away from cities or railway stations. Road transports is the basis for the functioning of the transport system and thus for society.

The transport system is a system – and road transport in Sweden is largely interconnected with the other transport modes through combined transports – primarily road, rail and sea, where possible. The functioning of the railway system is thus an important factor also for road transport companies. An efficient, faster and more frequent train traffic – with better predictability and less interruptions – would strengthen the transport system as a whole.

In addition, following the logic of maximizing load factor, longer and heavier trains contribute to a competitive and sustainable transport system.

Combined transport or intermodality?

The terms refer to the same phenomenon: that goods carried in one and the same cargo carrier (for instance a container or a trailer) are transported with different modes of transport (rail, air, sea, road). A transport of one and the same unit of goods divided into sections.

Truck transport is essentially short-range, and the »invisible border« (under which combined transport is no longer logistically sensible) at about 300 kilometers is determined by the cost of loss of time a transfer would imply. Trucks are in most cases the fastest, cheapest and most flexible transport mode, and even for longer distances sometimes more cost efficient than transferring to more efficient transport modes. Other obstacles to transferring to other modes relate to the value of the goods, sensitivity to time, temperature or shock; or that there simply is no other transport modes available.

Which goods should go where – train, truck or ship?

This depends not on the type of good itself. Items and loads shipped with containers, pallets and other load carriers that are transferable can be transported intermodally. The transport distance, type of load carrier, value of the goods, and time sensitivity are factors taken into consideration when planning a transport operation.

However, an increased share of transshipment to other modes of transport has its consequences for infrastructure and the logistics system. New hubs in large scales must be established to manage the much larger volumes arriving in bursts rather than in a steady flow. This would affect total transport times as waiting times would increase, as a vessel or train would not embark until it is fully loaded. This in turn would need large areas for storing of trucks and containers. At the point of arrival, say for instance a port, 60 trucks are loaded off at the same time, increasing congestion. Areas adjacent to harbors and terminals would at times be heavily congested and transports would take a longer time. Thus, in planning of urban areas dependent on combined and intermodal transports, infrastructure and traffic planning need to take into consideration an, at times, heavy traffic.

Long-haul road transports, which make up about a quarter of the total of truck transport, are typically most suitable for transshipment. There is a great potential in streamlining the transportation system with intermodal transports in import and exports; where sea and rail are more efficient transport modes.

Long-haul road transport is also the market segment most exposed to competition from foreign operators. Operators that, because they are likely to refuel outside of Sweden, have greater emissions. A possible effect of the eco-bonus is therefore that Sweden promotes transports with higher environmental and climate performance.

Eco-bonus: a state-funded financial incitement for ship-owners registered in an EEA-country carrying out intermodal transports. A ship-owner using a Swedish port for either load or unload of goods from another transport mode can be the beneficiary of support.

DIGITIZATION

Digital solutions for coordinating freight transport can contribute to a greater efficiency. One such interesting initiative is the public-private partnership Mobility As A Service, which is part of ERTICO ITS, an EU coordination project for intelligent logistics. This type of collaboration, where authorities, researchers and entrepreneurs jointly develop solutions, has a great potential on streamlining the logistics. Coordinated transport of goods has a great potential in reducing emissions and the digital aids simplify such coordination.

One important factor that distinguishes Sweden from the rest of the EU is that commercial transport operators with freight vehicles in all weight categories must carry a permit. This means that commercial transports must be carried out by companies and not private individuals. Reviewing how the sharing economy can contribute to transport efficiency is important, since many such initiatives in the transport sector has been acting as a freight forwarder. Transport of goods is a heavy regulated market, and the companies has long-standing professional knowledge and skills when it comes to safe and secure as well as socially and environmentally responsible transport operations.

HIGH CAPACITY VEHICLES



Sweden has longer and heavier vehicles than do the rest of Europe. Through the European Modular System, combinations of existing loading units into longer and heavier vehicles are used, allowing vehicle combinations of a length of 25.25 meters and a weight of 60 ton. High capacity vehicles reduce fuel consumption, greenhouse gas emissions and costs.

As of July 1, 2018, vehicle combinations with a total weight of 74 ton are allowed on some parts of the road network. At the time of writing, the government is expected to propose a new law allowing also longer vehicles.

Studies of high capacity vehicles, with a weight of 74 and 90 ton and a length of 30 and 32 meters, in the logistics associated with the forest industry show that diesel consumption decreases by 20 percent and the number of vehicles decreases by 35 percent,¹⁵ if the same amount of goods had been transported with conventional vehicles.

As for the future increase of transports, and the intermodality aspect, analysis from CLOSER show that high capacity vehicles can increase the market share of road transport in relation to rail and maritime shipping. How high the share of road would be is difficult to estimate, but CLOSER concludes it will happen regardless of the introduction strategies and different scenarios. However, the total number of vehicles decrease if high capacity vehicles are introduced.¹⁶

As for road safety, a study of police-reported accidents show that the risk of accident is lower for longer vehi-

cles. However, it is uncertain whether this is since longer vehicles drive on better roads, or that the drivers of such vehicles are more experienced.¹⁷

FAIR TRANSPORT

It is becoming increasingly clear that transports play a role in climate impact and that transport is an important point in the transition to a sustainable society. Transport is a central part of welfare, business, society - and is a prerequisite for all the activities that characterize a modern society. We have therefore applied an approach where transport is a necessary evil, instead of turning the perspective over and trying to see how transport and transport operations can minimize external effects and be the good and the service that better match the self-image of the transport industry.

Fair Transport is the Swedish Association for Road Transport Companies' sustainability initiative, which makes sustainable transport visible and supports transport companies in the change process. The transport companies can declare data with regards to climate and the environment, road safety and social responsibility. Fair Transport is also a way for transport buyers to illustrate what benefits can be achieved and what changes can be done over time.

Fair Transport aims to replace price competition with quality competition, and as part of its work, training initiatives are carried out in relation to transport buyers of public and private sector alike, as well as transport companies.

By providing the right information and knowledge about how a transport company's sustainability data is identified, valued and followed up, the transport buyers can identify transport companies which do not only provide transport delivery services, but are also actively implementing important sustainability aspects. Fair Transport allows the transport companies to record its data, enables it to be fact checked and followed up, and all information is gathered into a sustainability report that simplifies monitoring.

The value changes in our world is clear – more and more transport buyers are now demanding transports with lower emissions. Not least, the public sector is the forerunner that sets clearer, stricter and more comprehen-

sive requirements and therefore is catalyzing a change to transports with lower emissions. In a competitive situation with clear cheap alternatives, transport companies in Sweden can use this as a basis to be able to work on reducing their emissions. Customers who value transport companies that have a sense of responsibility means that we have now a greater range of motion, and we may be facing a time in the Swedish haulage industry, where the lowest price is no longer always favored.



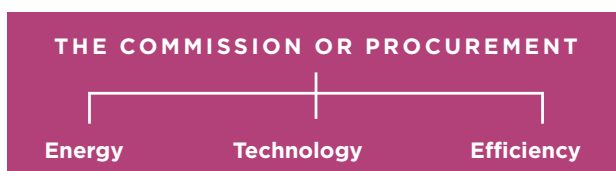
4. Commitments

Transport companies must work actively to reduce their emissions, and those who are not already exploring the possibilities in new technologies and new fuels will fall behind. The issue of emissions must become part of the strategic decisions. A viable and sustainable transport industry takes responsibility for its impact on climate.

In addition, the demands of the outside world are increasing, and laws and rules that govern transports are changing the conditions. It is therefore a great competitive advantage to be an early mover – to be the entrepreneur that stands because he/she already has a plan to reduce emissions in 2019 and to become completely independent of fossil fuel in the long term.

The transport companies' efforts to reduce emissions are evaluated on the basis of cost-effectiveness, economically long-term benefits, and safety to the ecological, economic and social sustainability aspects. From this perspective, it is wise to take advantage of the low hanging fruits first – more efficient transports through high capacity vehicles, aerodynamic improvements of vehicles, and fossil fuels with a mix of renewable. The technological development is growing fast and we probably hardly know the technical solutions that will dominate in 2045.

Today, transport companies are working continuously to streamline and reduce fuel consumption, invest in new vehicles, and comply with regulations regarding the emissions of both greenhouse gases and environmental pollutants and particles.



Those who actively work to reduce their emissions must do so together with their customers – and therefore the operation is central. Demand for climate-better transport changes and creates other opportunities and conditions, and together with the transport companies'

own commitments, opportunities can be created for fossil-free truck transport.

When negotiating with a prospective customer, much can be achieved in terms of logistics planning, vehicle purchases and fuels for the transport assignment.

In addition to their financial and social sustainability, their commitments also include focusing on emissions, and are carried out in relation to customers seeking transport services. By sharing information in order to increase demand for fossil-free transport, price competition can be left behind, and companies can compete with quality in the transport service. Those who invest in reducing their emissions, for example through large investments in vehicles with alternative fuels, will have a competitive advantage if transport buyers are also demanding transport with lower emissions.

One example, among many, on how transport companies and cooperative transport companies work today to offer customers a better alternative is Sundfrakt Cooperative Transport Companies. They offer three options on their service for the company to reduce its emissions through the transport commission itself. Customers are offered three levels of quality and are informed of the climate effects of the operation.

Gold

- The transport is carried out with fuels that provide at least 85% CO₂ reduction
- The vehicle has at the lowest Euro class 5
- Pre-calculation that provides forecasts on climate benefits
- Continuous follow-up showing the effects achieved

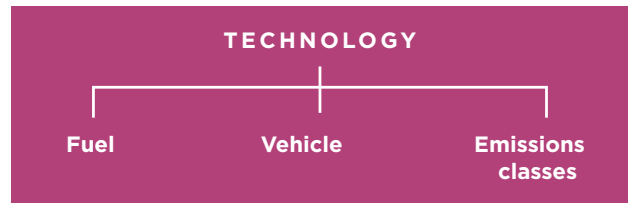
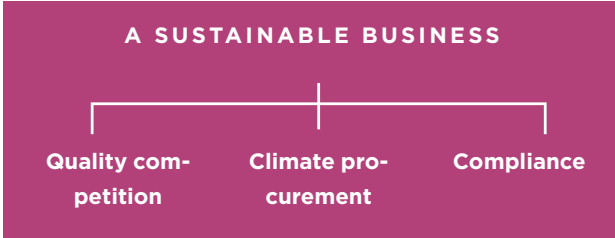
Silver

- The transport is carried out with fuels that provide at least 45 % CO₂ reduction
- The vehicle has at the lowest Euro class 5
- Pre-calculation that provides forecasts on climate benefits

Bronze

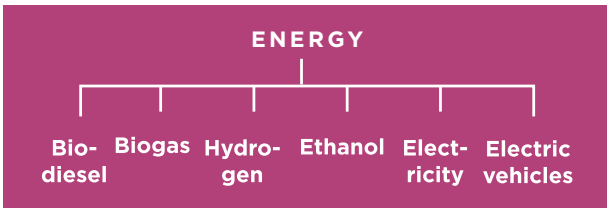
- The transport is carried out with fuels that provide at least 30% CO₂ reduction
- The vehicle has at the lowest Euro class 4

- Pre-calculation that provides forecasts on climate benefits



ENERGY

Alternative renewable fuels will be used to a much greater extent. Applications will depend on price, range, load capacity, energy efficiency and content. Truck transport will be much more specialized with the right vehicle and fuel for a specific transport. The large truck manufacturers today have a large fleet of different types of vehicles that use biogas, diesel (bio as well as fossil) and electricity, and transport companies can actively assess which options are best suitable for their particular transport assignments.



TECHNOLOGICAL DEVELOPMENT

The development in vehicle fuel efficiency and technical measures that reduce emissions is an important contribution. The evolution of the euro classes is a good example of this, where a truck with euro class 6 is broadly emission-neutral in terms of environmentally harmful emissions (excluding greenhouse gases, which depend on the fuel). Investing in a new, modern truck is therefore an important measure to reduce emissions.

The currently available technical aids with the greatest benefit are speed control, tires with low rolling resistance, good aerodynamics, low tare weight, all of which give higher load capacity as well as improvements in engine and efficiency.

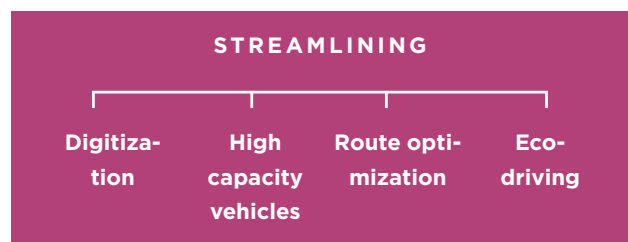
Standards for carbon dioxide emissions are an important aid, both for the transport company to be able to, when negotiating with a customer, identify the best vehicle for the assignment and ensure improvement of the vehicle fleet; and form the basis for differentiating policy instruments after emissions.

EFFICIENCY

Transport efficiency means to get as much as possible while driving, and to drive as efficiently as possible, both in terms of distance and vehicle performance.

Sweden already allows longer and heavier vehicles than the rest of Europe, which makes our transports more efficient and safer. Sometimes, the need for further longer and heavier trucks is questioned as the number of empty transports is high. In fact, the number of empty transports would be very low if only those that can actually be made more efficient are counted, since return transports are not always possible. For example, while it is common to transport timber out of the forest to a sawmill or pulp mill, nothing is usually transported back to the forest. The empty transports that can be excluded are often the result of inflexible time slots, just in time deliveries, and time pressure in the production industry which makes optimized logistics more difficult. More flexible time frames for deliveries therefore result in simpler and more effective transports. The fact that warehousing is increasingly declining implies that companies are increasingly relying on just in time transports and that storing of goods are on trucks rather than in warehouses. This tendency greatly increases the time sensitivity in transport and is also a factor that reduces the tendency to use other, sometimes slower modes of transport like rail or sea.

Digital aids can help in coordinating logistics, in integrating low speeds, where possible, and in providing feedback to drivers on fuel consumption. Eco-driving can reduce emissions by as much as eight percent, according to the IRU, the International Road Transport Union.



5. Policy suggestions and analysis



A legislation that guarantees long-term policy must be ambitious and with a clear objective. The focus must be that the polluter pays. At the same time, it cannot be excessively controlling or fixed to a specific technical solution. Instead, it must be flexible to be able to test different solutions and choose the most cost-effective measure. Policies should also avoid incurring additional costs for transport companies as it may impair investment in new vehicles and technologies that lower emissions.

The change that needs to be made for the transport companies to become fossil-free is mainly concentrated in three areas: energy, efficiency and competition and regulatory compliance.

The roadmap is also considering and reasoning in specific policy proposals that have been highlighted in previous material from government agencies and research institutes.

PROPOSALS PRESENTED ARE AT DIFFERENT LEVELS OF ABSTRACTION: FROM DETAILED TO MACRO

Energy	Efficiency	Competition
Emissions data	Conflicting objectives in infrastructure planning	Climate obligation for the public sector
Bonus malus	Decarbonized mobility	European climate policy
Investment support for bio refineries	Road infrastructure	The combined transports directive
Defend biofuels in Europe	City logistics	Review taxes and charges in the transport sector
Reserve biofuels for heavy transports	Systems perspective on logistics	Distance based taxing
Electric road	Fossil-free zones	
	Digitized logistics	
	Higher bearing capacity	
	Increase the volume of trucks	
	Financial support for transshipment	

ENERGY

Within this field, there are policy proposals for financial and administrative instruments that promote higher energy efficiency, efforts to increase the volume of and accessibility to renewable fuels and knowledge-enhancing initiatives that drive the development of fossil-free vehicles.

Emissions data

Most policy proposals for energy-efficient and fossil-free vehicles require reliable and standardized methods for measuring real life emissions. The methods should be harmonized on the European market, and Sweden should push for stricter levels and common methods.

- Data should be made publicly available, in order to make it easier for transport companies to make informed decisions and to avoid market failures such as cartel formation and manipulated tests.

- Life cycle perspective should be the norm and “well to wheel” values the basis for policy instruments.
- In addition, emissions in relation to the amount of goods transported should always be considered, as they provide more accurate data on emissions.
- It is also important that actual emissions are reported, rather than models and mean values. It contributes to informed decisions and more accurate policy.

Bonus malus

A rapid introduction of vehicles with low life cycle emissions of carbon dioxide is stimulated by tax and benefit rules. Vehicle emission standards can be used to design other instruments to justify investments in vehicles with lower emissions.

A bonus malus system for trucks would require standardization beyond what is practical or useful for the industry. Heavy vehicles are highly specialized in terms of engine, fuel, type of transport and geographical area where it is to be used; and combinations of these factors are many.

A system based on carbon dioxide norms is a more effective and practical way to improve the vehicle fleet and incite better investment decisions.

Investment support for bio refineries

The reduction obligation quota has the potential of being a long-term stable instrument that paves way for lower investments. The volumes of biofuels need to increase. Eliminating obstacles to investments in bio refineries for the production of lignin and cellulose based fuels include evaluating financial support.

Defend biofuels in Europe

Sweden must defend biofuel production in the European political context. There must be room for greater flexibility and consideration for different agricultural and forest conditions between countries.

Reserve biofuels for heavy duty vehicles for emergency situations

The Swedish Association of Transport Companies has for a long time pushed the issue that diesel should be reserved for trucks in a crisis or shortage situation. Transport is central to homeland security and from a defense perspective and diesel fuel and trucks are oftentimes the only alternative.

With the rapid development of electrification of passenger cars, it should be considered whether the scarce biodiesel at all should be used for cars and not reserved for transport modes whose transition from fossils is more complicated. When and if restrictions in raw materials severely limit supply of renewable biodiesel, as large volumes as possible needs to be made available to air and truck transports.

Electric road

Which roads are suitable to convert to electric roads? The electrification of roads would initially have the greatest effect on distances between ports and industrial facilities, joining together terminals and factories on heavily frequented stretches.

Different business and financial models need to be further investigating, considering factors such as charging, ownership and financing.

EFFICIENCY

In this field, there are many proposals for instruments that would optimize existing transports, and some that optimize the transport system as a whole.

Transport efficiency means to get as much as possible while driving, and to drive as efficiently as possible, both in terms of distance and vehicle performance. The quantity of goods in relation to distance, or emissions, is as high as possible if the transport is efficient.

In an efficient transport system, logistical planning should contribute to seamlessness, interconnected and connected systems that remove thresholds.

Conflicting objectives in infrastructure planning

In existing policy, the relationship between policy objectives such as safety, environment and climate need to be clarified. Societal cost, loss and gain from prioritizing between such objectives need to be assessed, including costs of climate change adaptation of infrastructure – and potential cost of not adapting to climate change risks.

Decarbonized mobility

Reduce emissions, not mobility.

Road infrastructure

The Swedish Transport Administration assess that the current road capacity is enough. Functional shortcomings in the road network must be addressed in order to ensure road safety and environmental road traffic. Capacity needs to be strengthened in accordance with the forecasts of increased traffic in both 2030 and 2045. The basic forecast shows that the total increase in ton between 2012 and 2040 will be 59% .

Regardless of the growth in other transport modes, freight transport on the road is increasing. The transport modes complement each other rather than compete. Even if long-haul road transport can be supplemented with rail and sea, roads need to be strengthened and the capacity increased – not least to enable for high capacity vehicles.

City logistics

The planning of sustainable communities should include the planning of efficient logistics. In addition to the mobility of people, cities need functioning areas for logistics, that allow for loading and unloading, that drivers can park the truck and take a break. Poor accessibility means longer transport distances, and that drivers face difficulties in meeting rules on driving and resting times.

The development in e-commerce, and the likelihood that deliveries in urban areas will be predominately electric, suggest that trucks will be smaller and deliver with more frequency today.

Systems perspective on logistics

Local municipalities procure transports and develop methods suitable for their specific needs. Sometimes this includes preferring some technical solutions above others, and sometimes different levels of ambition. Transport companies rarely operate exclusively in one area only. If adjacent regions and municipalities prefer different solutions, the logistics system functions imperfectly. An efficient logistics system benefits from economics of scale and coordinates transports as much as possible.

Fossil-free zones

Environmental zones are justified and necessary when they are aimed to limit the emissions of environmentally harmful air pollutants and particulate emissions in a limited geographical area with poor air quality due to heavy traffic. Since heavy trucks are covered by the Euro class system, and because modern trucks, Euro class 6, have almost zero impact on the environment (except for noise), trucks will soon have almost no local environmental impact (except for noise).

Environmental zones can mean very high costs for individual companies and can make it difficult to achieve optimum logistics by creating more transports (trucks will circumnavigate). A differentiated congestion tax based on the vehicle's Euro class is, from this perspective, preferred.

Greenhouse gas emissions do not constitute a local environmental impact, as greenhouse gas emissions and the problems of global warming are global in nature. A fossil-free zone, although communicative and intuitively attractive, does not contribute to the lowering of emis-

sions. Rather, they can cause more emissions, as transport companies can be forced to drive around to deliver goods.

Digitized logistics



Digital solutions for coordinating freight transport can contribute to a greater efficiency. Public-private partnerships or systems that are already used today by freight forwarders and larger transport companies are elements that can already contribute to a greater efficiency.

Questions on sharing economics within freight transport occasionally pop up. The regulations for professional traffic must be reviewed in order to adapt to modern sharing economic elements, but the potential for such regulations to replace the existing logistics system to a greater extent is small.

Reviewing infrastructure support for coordinated logistics is useful, and it is at best a somewhat open and transparent system that can be shared by more to achieve the greatest possible efficiency.

Higher bearing capacity

The road network for bearing class 4 for heavier, more

efficient trucks should be expanded as soon as possible for the greatest climate and socio-economic benefits. In the current infrastructure plan for the years 2018 to 2029, the Swedish Transport Administration plans to have almost half of the road network with load-bearing class 1 upgraded to load-bearing class 4. The upgrading could be faster. The benefits of using heavier vehicles will be delayed, which is a barrier to meeting the carbon emission level targets.

Larger volume

In addition to the increased weight which mainly optimizes the heaviest (in relation to volume) transports (e.g. concrete and timber), a higher permissible length would contribute to a large climate benefit in the transport industry. A very large proportion of freight transport is volume-based, especially in general goods and parcels, where packaging and air are transported. 34-meter-long vehicles would make truck transport much more efficient.

Further research and demonstration projects for longer and heavier trucks should be carried out to ensure as efficient road transports as possible - we do not have to stop at 74 tonnes and 34 meters.

Financial support for transshipment

The total cost of transport is the main obstacle when it comes to transshipment to other more efficient modes of transport. A transshipment support for transport buyers should be designed to remove this obstacle and thus making other transport modes relevant for particularly long-haul transports.

Long-haul transports is also the market segment most exposed to competition from companies with substantially lower transports cost (particularly costs for personnel and fuel). Costs are lower due to Sweden's comparatively higher labor costs, fuel taxes, and the reduction obligation quota. A possible effect of supporting transport companies moving goods from road to rail and sea is therefore that better fuel is promoted.

COMPETITION

Climate obligation for the public sector

Many public sectors actors are also major transport buyers. If more public actors require decarbonized transport, it nudges the haulage industry. Is such public se-

ctor transport buyers would have climate requirements, such as gradually lowering their total emissions, that would drive the fossil-free transition.

Let the The National Agency for Public Procurement (Upphandlingsmyndigheten), with the support of relevant authorities, such as the Swedish Association of Local Authorities and Regions and industry players, review possible mandatory climate requirements for public actors.

European climate policy

Developments in the European climate policy play a role in Sweden's competitiveness and the opportunity to achieve our climate policy ambitions. It is of the utmost importance that Sweden pushes for climate policy within the EU to be tightened in accordance with the Paris Agreement. Not only that, but also for the European transport policy to be tightened as well. It is needed both to achieve the goals and to create good competitive conditions.

Remove the directive on combined transport (92/106/EEC)

Incentives to increase the attractiveness of combined transport are needed, but the combined traffic directive (Directive 92/106) is obsolete and does not provide an incentive for transshipment, but rather contributes to unhealthy competition in the road transport sector. The directive should be abolished because it has played out its role, even if it had the purpose of promoting combined transport. If it has been considered to have played a role in recent years, it is only because low-paid Eastern European transport companies have been allowed, without limitation in number and time, to carry out combined transports in other EEA countries.

Review taxes and charges in the transport sector

A number of different taxes and charges affect the transport industry. Fuel taxation varies between countries based on the minimum level of the Energy Tax Directive. The vehicle tax also has provisions at EU level regarding minimum levels. In addition, there are a variety of congestion taxes and infrastructure charges within Sweden and the EU.

The patchwork of taxes and charges must be smarter, and a comprehensive review of taxes and fees must be

carried out. With the current system, income from fuel taxes erode the greener transport becomes. A differentiated tax system that is better fit and creates a level playing field is needed. Swedish fuel tax is the second highest in Europe and can not be differentiated between renewable and fossil as long as the reduction obligation quota is in place.

Distance based taxing

Regarding a distance-based tax model as strengthening the competitiveness of the road transport sector is not entirely uncontroversial. However, a properly designed road tax can strengthen the competitiveness of the Swedish haulage industry in such a way that it contributes to reducing carbon dioxide emissions from heavy transports.

Additionally, such a system could contribute to better compliance with rules and also smoothing out competition between foreign and domestic transport companies. With the right design a distance-based tax can in-

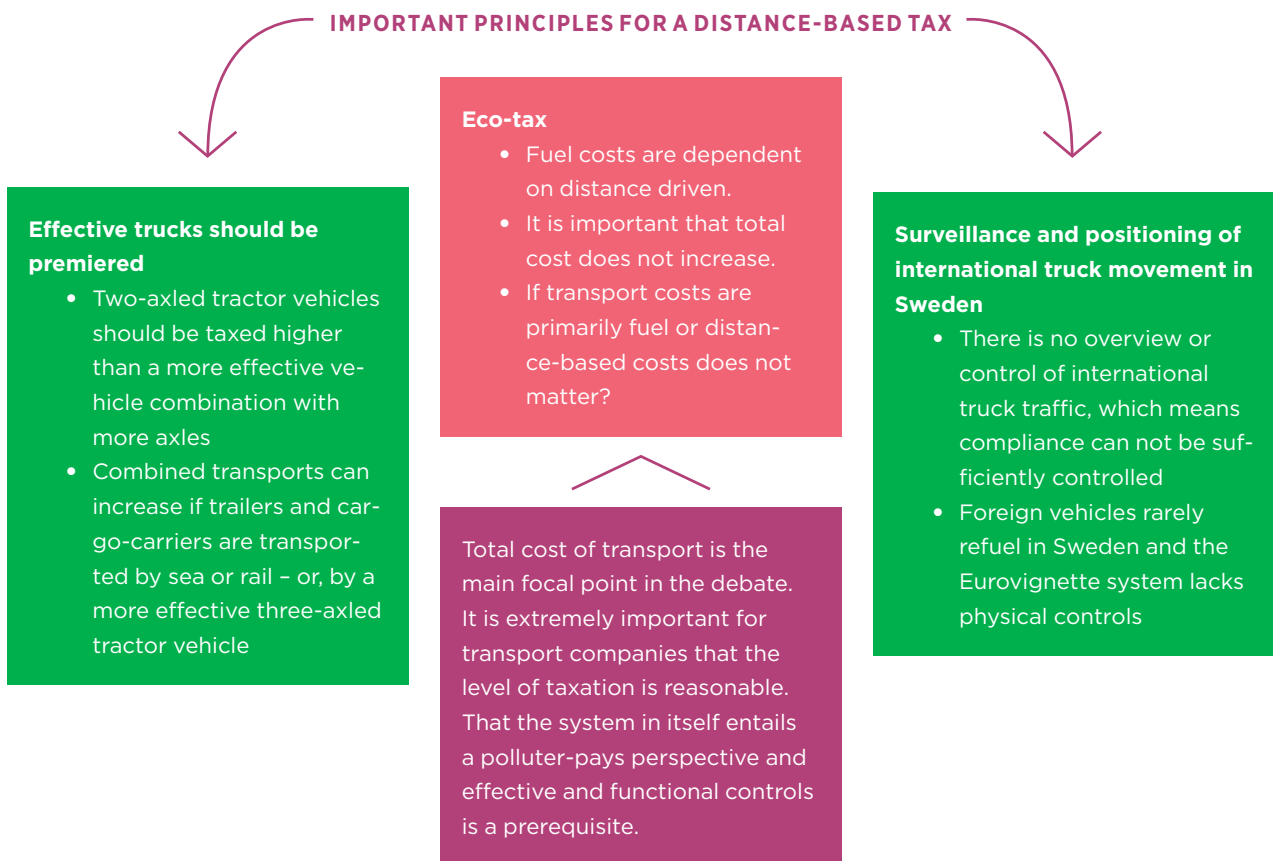
ternalize other costs that heavy trucks cause: like noise, congestion and road wear.

Distance-based taxation is not easy to introduce and involves dealing with several different policy areas simultaneously. What follows is a theoretical reasoning on a system, where a lot of questions still need to be investigated. For instance, if the then-be new law of road tax also is supposed to simplify compliance of rules on driving and resting times, this also has to be a purpose of the new law. The possibility to combine multiple policy objectives at the same time under the different directives need to be investigated.

Tax on distance instead of fuel

The fuel tax can be lowered, enabling a road tax that creates incentives for lower emissions.

Fuel tax will eventually generate lower revenues as the environmental and climate targets are realized. Furthermore, the fuel tax results in inconsistent effects. It does



not constitute a smart “polluter pays” system. When introducing a distance-based tax, a review and possible adjustments in other transport and vehicle-related taxes must be made, as the overall picture regarding costs is extremely important for the competitiveness of the transport companies. For the Swedish haulage industry, personnel and fuel costs represent two-thirds of the total costs. Both of these are significantly higher for the Swedish companies in comparison with foreign companies, which means that they represent a competitive disadvantage for the Swedish companies.

The Energy Tax Directive allows the energy tax on fuel to be lowered for commercial traffic over 7.5 tons in order to have a road tax, which is paid by all companies that drive on the Swedish roads. In the case of cross-border transport, refueling can sometimes be controlled so that it takes place where the fuel is the cheapest, which in these cases makes the tax ineffective as a climate control agent. Another EU directive that is important here is the Eurovignette Directive. It regulates road taxes on vehicles over 3.5 tons total weight. However, it is possible to choose a higher weight limit, and one advantage for choosing 7.5 tons instead of 3.5 is that it is then legally possible to differentiate fuel taxation between vehicles above and below 7.5 tons. At a selected line of 7.5 tons vehicles, it is possible to have different fuel taxation for vehicles that are, and are not, road tax liable. However, it must be assessed and analyzed whether the limit can be set to 7.5 tons without causing a significant shift to smaller, non-taxable vehicles.

Vehicles

Tax should be charged on tractor unit, and must be based on its emission performance

Road tax should be based on the vehicle's greenhouse gas emissions in relation to amount of transported goods. A system based on the number of axles on the vehicle; or vehicle combination; on whether the truck has a towing device or not; or on the total weight of the vehicle combination; does not create incentives for more efficient vehicles. It would create an unnecessarily complicated system, and not award trucks with lower emissions. A system where the polluter pays would reward a multi-axle vehicle higher than a vehicle with few axles for a given total weight. This is because axle loads are by far the most important vehicle properties that affect road wear.

“Vehicle combinations with more axles are better both from the climate perspective and for reduced road wear - more axles on a longer vehicle combination mean lower emissions per transported unit and lower wear per axle”

A differentiation that takes into account both axles and weight can quickly become complex. A system that takes into account each individual's trailed properties in the form of number of axles and weight also requires the driver to report data for the current combination and change these data whenever the trailer is disconnected and connected.

This begs the case of refraining from differentiating tax on basis of weight and axle configuration. Most European countries today differentiate based on the number of axles where vehicles with more axles pay a higher fee than vehicles with fewer (with the reasoning that a the more axles, the heavier the vehicle), has resulted in the negative effect that two-axled vehicles pay a lower road tax than do three-axled; and the two-axled vehicle incur substantially higher road wear. By refraining from differentiating based on total weight or number of axles, the tractive vehicles properties can be decisive for the tax rate. This also simplifies control.

Since vehicle combinations have different maximum weights, and the heaviest and longest truck has the most axles and thus the lowest emissions per amount of transported goods, such a vehicle should not be taxed higher than a much more dangerous and inefficient

two-axle tractor unit. By imposing taxes on only on tractor units, regardless of their potential weight, there will be more incentive to have full loads. It will be, even more than today, in the interest of transport companies to increase load.

If the Eurovignette directive is amended as proposed by the Commission, a differentiation based on carbon dioxide emissions is possible.

Roads and differentiation

All roads should be included.

In order not to cause traffic on roads that are not taxed, the entire public road network should be taxed. Differentiation of the tax according to geography ensures that industry and business in rural areas can maintain their competitiveness. Since the change of tax from high fuel tax to road tax is a necessity to strengthen the competitiveness of the Swedish haulage industry, it is a prerequisite for the entire road network to be taxed. Therefore, a differentiation for regional policy reasons is important.

Compliance and control

Controls should be automatic, and authorities should be able inspect on board units.

It is a starting point to ensure that inspections and vehicle equipment, which will enable both the collection of taxes and the simultaneous inspections of other legislations, are safe and working. The system should be simple and cannot be manipulated. Imposing taxes only on tractor units simplifies inspections in practice (see the discussion under the section Vehicles above).

Inspections must be able to be carried out in an efficient manner, and the introduction of a road tax is only possible with methods on how to inspect and follow up. There are good reasons for having inspection stations at the national borders, in addition to fixed and mobile inspection stations along the road network. There are great difficulties in collecting debts from abroad, and thus by having an inspection station just before leaving the country, it is possible to stop vehicles that are about to leave Sweden with an unregulated debt.

The system should be an administrative law because if under the criminal code, there is a great deal of inertia when a foreign party is involved.

As for vehicle equipment requirements and the vehicle's own equipment, inspection authorities must have access to check that they work. There have been incidents when government officials on their own initiative got equipment to read from the CAN bus. Manufacturers of vehicles believed that there was an unauthorized intrusion into the vehicle's computer which, according to the manufacturer, could have destroyed the information and settings.

The inspection authority must have the authority and permission to check the equipment's function and obtain information, even if it is the vehicle's own equipment.

Ensuring that controls work is crucial. With a fine-meshed network of inspections, both the income from tax, fines or penalties increases; and so also the possibility of making simultaneous inspections on other legislation.

One possibility would be to require a guarantor for foreign transport companies, where the purchaser of the transport would be responsible for ensuring that the road tax is paid.



6. References

1. Energimyndigheten. ES 2017:1. Transportsektorns energianvändning 2016.
2. Ibidem, 13.
3. Trafikanalys Rapport 2015:12. Lastbilars klimateffektivitet och utsläpp, 13.
4. Statistiska Centralbyrån. Statistikdatabas, Miljö, Utsläpp av växthusgaser från inrikes transporter.
5. Naturvårdsverket Rapport 6782. Fördjupad analys av svensk klimatstatistik 2017, 62 ff.
6. IVL Svenska Miljöinstitutet rapport nr c268. December 2017: utvärdering av samordnad varudistribution i Södertörns kommuner, 27.
7. Trafikanalys Rapport 2012:8. Godsflöden i Sverige, 7.
8. Trafikanalys Statistik 2017:14. Lastbilstrafik 2016, 15.
9. Trafikanalys Statistik 2017:14. Lastbilstrafik 2016, 15.
10. Trafikverket Basprognos 2016. Prognos för godstransporter 2040, 39.
11. Energimyndigheten ES 2017:1. Transportsektorns energianvändning 2016.
12. Energimyndigheten ES 2017:1. Transportsektorns energianvändning 2016, 7.
13. Sweco Rapport (2016-03-14). Scenarier för gasanvändning i transportsektorn till 2030. (<http://www.energigas.se/library/1689/scenarier-gasanvaendning-i-transportsektorn.pdf>)
14. Regeringen (2018-07-08). Regeringen satsar på produktion av biogas: pressmeddelande. <https://www.regeringen.se/pressmeddelanden/2018/07/regeringen-satsar-pa-produktionen-av-biogas/> [2018-08-08].
15. Energigas Sverige. Statistik om fordonsgas. (<http://www.energigas.se/fakta-om-gas/fordons-gas-och-gasbilar/statistik-om-fordons-gas/>). [2018-08-08].
16. Skogforsk. ETT – Modulsystem för skogstransporter.
17. Regeringen. Effektiva, kapacitetsstarka och hållbara godstransporter – en nationell godstransportstrategi, 42.
18. Closer, Lindholmen Science Park. Årsrapport High Capacity Transport 2016, 18. (https://closer.lindholmen.se/sites/default/files/content/resource/files/arsrapport_hct_2016.pdf)
19. Ibidem.
20. Chalmers tekniska högskola, 2014: Accident Analysis for traffic safety aspects of High Capacity Transports, 36.
21. Trafikverket. Rapport för godsprognoser 2040 – Trafikverkets Basprognoser 2016, 26.



