2020 Research report summary

# Climate policy and the transport sector

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SNS

# Summary

GREENHOUSE GAS EMISSIONS from the transport sector are increasing in Sweden and in the EU. Admittedly, emissions for domestic transports are declining in Sweden, but the decline is slow in relation to the target adopted by the parliament. The carbon dioxide emissions from domestic transport (excluding aviation) should be reduced by 70 percent by 2030 relative to the 2010 level. So far, the reduction is moderate in relation to the target and has mainly been achieved through increased use of biofuels. Produced in a sustainable way, biofuels can be an effective tool to reduce carbon emissions from a short-term time perspective. The problem is that biofuels, produced in a sustainable way, meaning a way that does not compete with food production, contribute to deforestation or reducing the carbon stocks in forest biomass, which is a scarce resource. Currently, the lion's share of biofuels used in the Swedish transport sector are imported from other countries.

In light of the tough political goals for increased vehicle fuel efficiency, high taxation of fuels, and a host of other measures, such as investments in public transport, railways, and bicycle paths, it may seem surprising that fuel consumption is increasing in the transport sector. The purpose of this report is to answer three questions:

- Why is fuel consumption increasing in the transport sector?
- How effective are various measures in reducing emissions caused by the transport sector?
- How should policymakers deal with the emissions?

# Travel and transport increases for two reasons

The increase in travel and transport is a long-standing trend. Between 2010 and 2018, passenger car traffic production (the number of kilometres driven) increased by 9 percent in Sweden. During the same period, public transport travel increased by 29 percent and truck traffic production increased by 17 percent. Admittedly, the population also increased by 9 percent, but it is unlikely that immigrants contributed much to the increase in car travel (however, they may certainly have contributed to increased travel by public transport). Hence, even if there has been a huge increase in public transport travel, this does not seem to have reduced car traffic.

Travel and transports increase over time for two reasons. One is the growing prosperity; we have more resources to spend on transportation, which allows us to invest in better infrastructure and smarter technological solutions for all modes of transportation. We can afford to increasingly develop comfortable, safer, and more energy efficient vehicles. Customers are willing to pay for faster deliveries, which also increases the need for lorry transports. As prosperity increases, so does demand for goods and services, which in turn increases passenger transport and road freight.

The second reason is that we live in an increasingly knowledge-based and specialized economy. Transportation increases accessibility for individuals and firms, which creates economic growth. Increased commuting distances mean that employees' skills better match the needs of specialized employers. Transportation also facilitates knowledge dissemination and exchange of ideas, creativity, and innovations, which increases productivity. Furthermore, transportation improves firms' accessibility to subcontractors and markets, which increases productivity through increased specialization and diversification. Transportation also facilitates the specialization of consumption and production of services. Increased road freight is caused by higher commodity values, and the need for fast deliveries is increasing just-in-time deliveries. Virtually all these mechanisms become stronger the more knowledge-intensive and highly specialized an economy becomes. We can therefore assume that the need for transportation will continue to grow over time. There is no evidence to support the idea that transport would stop increasing.

The increased availability leads to higher productivity and in turn rising prosperity, so that we get even more resources for transport. Better transport increases accessibility even more. The spiral is thus self-reinforcing over time. It is the very foundation of the huge increase in welfare we have seen in recent centuries.

# How effective are different measures at reducing the emissions from the transport sector?

There are two fundamentally different ways of reducing the transport sector's climate emissions: *economic instruments* and measures aimed at *improving alternatives* to road transport.

A carbon tax on gasoline and diesel is the most cost-efficient economic instrument reducing carbon emissions in the transport sector. This method is efficient, because the tax is almost perfectly proportional to emissions. Road users and carriers have great flexibility in their adaptation, which minimizes the cost for emission reductions. A uniform price of emissions also provides consumers with valuable information. They do not have to calculate which behaviour leads to the lowest emissions. When the cost of emissions is included in the price, people will strike the right balance between self-interest and the climate.

But high fuel taxation comes with complications. Emissions from the road transport sector are already taxed higher than emissions from other sectors. Most car journeys made in such a sparsely populated country as Sweden do not have any equally attractive alternatives. In all income groups and regions, there are also large individual variations in fuel consumption and car travel distance. Fuel taxation can hit households with low incomes and long transport distances hard, and it's difficult to compensate for this aspect through transfer payments.

The bonus-malus system[1] implies an increase in vehicle tax, depending on the type of fuel and carbon dioxide emissions, for the first three years of new cars. Vehicles with very low emissions receive a bonus. There may be reasons for an emission-dependent vehicle tax for new cars, but the Swedish bonus-malus system has been criticized by the National Institute of Economic Research and the National Audit Office for low cost efficiency. The National Audit Office also notes that the government had insufficient decision support and that no evaluation of the system's effect had been carried out or planned. In addition, 80 percent of the bonuses go to residential metropolitan areas.

High hopes are often put on reducing road transport through densification of buildings or improved alternatives such as telecommuting, travel-free meetings, e-commerce, railway investments, more public transport, or more bicycle paths. Of course, improved alternatives often create great benefits in the form of welfare, accessibility, and service, but there is little evidence that improved alternatives provide substantial reductions in emissions, while many of the measures

1. The idea of the bonus-malus system is to reward vehicles that emit relatively small amounts (up to 60 grams per kilometre) of carbon dioxide ($CO_2$), with a maximum bonus of 60,000 SEK, while burdening vehicles that emit relatively large amounts of $CO_2$ with higher vehicle tax for the first three years: malus. This way, the bonus-malus system can serve as a complement to the more general fuel tax and can contribute to reducing the transport sector's oil dependence and climate impact. (Source: www.transportstyrelsen.se)

that improve alternatives consume public resources. For example, public subsidies to regional public transport increased by almost 70 percent between 2008 and 2018, which is significantly faster than the increase in the number of passengers.

There are several reasons why improved alternatives do not result in any large emission reductions. First, travellers and carriers themselves know better than decision-makers and planners how to adapt their behaviour to the lowest cost in different situations. Second, improved travel options often lead to more travel rather than a diversion from car travel. So, additional travel on bicycle paths, public transport, and trains is usually travel that would otherwise not have been undertaken rather than travel that has been diverted from cars. Freight transport is also difficult to move between modes of transport. The choice of transport mode is largely governed by the value of the goods and the transport distance. For example, a transfer of freight transport from road to rail is only possible at distances longer than 300 km, but only 8 percent of transports with heavy lorries are longer than that.

Thirdly, improved alternatives have the greatest potential of reducing emissions centrally in large cities during rush hour, but such trips constitute a small proportion of total car travel. For example, the number of bicycle trips per capita has been increasing in central Stockholm but has been decreasing at the national level since the 1990s.

Digital communication has not dampened car travel and road transport either. Telecommuting often implies that the trips that are made become longer or that more trips with other purposes are undertaken. Individuals who can work from home sometimes, for example, can live further away from their job. Travel-free meetings are usually complementary to physical meetings, and they allow for more meetings over greater distances. It remains to be seen whether the COVID-19 pandemic can reduce transport demand in the long run, but it is too early to draw any conclusions on this.

## Electrification is a solution – but takes time

In the long run, electrification of road transport is the only realistic way to significantly reduce emissions from the transport sector. But in the short-term, biofuels produced in a sustainable way can play an important role in reducing emissions from the Swedish road transport sector. Unfortunately, for the whole EU and globally, this is not possible. In the longer term, it may also be better to use biofuels that can actually be manufactured sustainably for air and sea transport, which are the most difficult transport types to electrify.

The electrification of road traffic will lead to reduced government revenue from fuel taxes. The electrification process will take a long time, though, since the passenger cars sold today will remain in the car fleet over 15-20 years. For heavy long-distance transport, electric roads could be a cost-efficient solution.

## Mileage tax for electric cars?

The fuel cost for electric cars is low, as is the taxation of electricity and electric cars. For these reasons, some advocate some form of mileage taxation of light traffic. But there are at least two objections. First, the system and enforcement cost of a nationwide mileage tax would be high, especially if Sweden is the pioneering country. This means that a mileage tax would not be as effective as fiscal tax. Second, electric cars do not contribute to emissions; the small emissions from Swedish electricity production are internalized in the EU Emissions Trading Scheme, EU ETS. This largely eliminates the motive for taxing electric cars more than what the present energy tax on electricity and vehicle tax for fossil cars would cover, as long as congestion levels are limited and local. Parking fees and congestion charges are useful tools in congested urban areas. But because congestion mainly occurs during rush hour in big cities, which constitutes less than ten percent of total car journeys in Sweden, it is unlikely that welfare-optimal congestion taxes would raise revenue large enough to cover even a small part of what the fuel tax presently raises.

How severe and widespread congestion likely would be with a fully electrified vehicle fleet has not yet been studied. It is also possible to differentiate vehicle tax between residents in urban areas and residents outside urban areas, but, in practice, the definition of urban areas and rural areas will be difficult.

With the current tax on electricity and vehicles, the revenue from road traffic would cover the public cost for the road transport system, even if the car fleet were electrified. But they would not cover the current public costs for public transport and the rail infrastructure.

## Who should pay for railways, public transport, and electrification?

How society should handle the loss of fuel taxes and what responsibility individuals, businesses, and the public sector have in the electrification of road transports is, of course, a political issue. But it can make it easier for voters and decision makers to clarify different principles for taxation and subsidies in the transport sector. Until the 1980s, it was a matter of principle

justice that each mode of transport would balance public cost against revenue; that is, the expansion and maintenance of road infrastructure would be paid for solely by those using the infrastructure. Transferred to the present context, this would mean that it is the users of the road transport system who should pay for the electrification of the transport system. That would also mean that the railways and shipping users should contribute more the state's costs for these transports through increased track charges, port charges, and lock charges or fairway charges.

Today, the government has taken on a great responsibility for electrification of road transport by distributing bonuses and tax breaks for electric cars and investment support for private charging points. Of course, initial public support might be justified, as there is often resistance from consumers to adopt new technology. For the consumer, choosing an electric car is still more expensive and may involve greater risk-taking. The electrification of road traffic is also characterized by system effects, which means that the benefits of adopting the new technology grow as the system expands, for example more charging options along the roads. An obvious risk exists, however, that the public resources do not have the desired effect or are used for the purchase of vehicles that would still have been sold, especially given the EU's emissions requirements on vehicle manufacturers. For that reason, the aid should be evaluated gradually and reduced as the price falls for electric cars. The most important task for the government is to take responsibility for the expansion of the electricity networks along the road network. The market will not manage this on its own, because the electricity network is characterized by scale and system effects. The scale effect means that that the average cost decreases with the number of users. The present capacity that the electricity networks have along the Swedish road network is not enough for a fully electrified vehicle fleet. For example, some consumers will want an electric car only if there are available charging locations along popular holiday routes during peak season. Striking the right balance between public and private funding for electrification is also not easy.

## About the author

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