Transport analysis

Forecasts of the Swedish vehicle fleet

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Report 2017:8

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Summary

Background

The development of the road vehicle fleet will affect the conditions for future transport policy and the attainment of transport policy goals in several ways. The Government's long-term objective is for Sweden to have a fossil-fuel-free vehicle fleet. Financial and other policy instruments play an important role in this effort. The Government needs a documented basis on which to design effective financial policy instruments for the transport sector.

In light of this, Transport Analysis has been tasked by the Government with providing statistics on and short-term forecasts of the development of the Swedish vehicle fleet in terms of, for example, fuels, weights, and carbon dioxide emissions for both light and heavy road vehicles, and with providing long-term assessments of these aspects. This assignment is new, and has not previously been carried out by Transport Analysis or any other Swedish agency.

Method, limitations, and choice of roads

Transport Analysis has chosen to make quantitative forecasts for the current year and the next three years, while the long-term assessments will include prospective analyses of technology development and the world around and be more qualitative in nature.

Based on a methodological review of the available models and their statuses, Transport Analysis has chosen to make the short-term forecasts by developing a special method to deal with the development of the road vehicle fleet in use that takes into account both not-in-use/deregistered vehicles and newly registered vehicles. The method is based on the historical development of the fleet, forecasts by other entities of various external factors, and Transport Analysis assessments of the development process in the near future. Because Transport Analysis is basing its forecasts on historical development, some of its forecasts will naturally also be based on implemented rather than future policy, which is consistent with the directions for the assignment.

Transport Analysis has obtained assistance from a consultant in preparing documentation to serve as part of the basis of the long-term assessment. Our efforts have focussed primarily on the issue of fuels, covering the period up to 2030. Transport Analysis has also proceeded based on the consultant's analysis, and incorporated ideas concerning automation and the development of the vehicle fleet from certain other standpoints.

Given that this assignment is new, Transport Analysis has chosen to impose certain limitations at this stage. For example, the short-term forecasts cover the passenger car, light lorry, and heavy lorry vehicle categories, which together account for roughly 85% of the Swedish road vehicle fleet in use. We are making a weight forecast for heavy lorries, as the vehicle circulation tax for these vehicles is weight based, in contrast to passenger cars and light lorries, for which the vehicle circulation taxes are carbon-dioxide based. If Transport Analysis is assigned an ongoing responsibility to make short-term forecasts, we can develop methods in dialogue with the Government Offices and work to incorporate more vehicle categories and vehicle fleet characteristics.

Some forecast results and assessments

The general forecast indicates that the number of vehicles in use will increase for both passenger cars and light and heavy lorries in 2017 and ensuing years, based in part on predicted population and GDP growth. The number may decrease over the considerably longer term, particularly with respect to passenger cars, in

the event that fully automated vehicles gain dominance and passenger travel in urban environments can occur via more taxi-like systems.

Regarding fuels, Transport Analysis believes that there will be relatively major changes in new registrations of passenger cars in the future, with electric vehicles eventually accounting for a larger, and growing, share of new registrations, even as diesel vehicles lose ground and the share of petrol-powered vehicles increases. Transport Analysis has assessed the rate of change for each fuel type, and the results for 2020 are shown in Table 1. The sensitivity analysis considered a scenario in which we have halved our assumptions regarding the rate of change for vehicles powered with alternative fuels.

Table 1. New registrations of passenger cars by fuel type for 2016 plus forecast registrations for 2017–2020 (source: Transport Analysis).

	At year end	Petrol	Diesel	Electric	Electric hybrid	Plug-in hybrid	Ethanol	Gas	Total
	2016	40%	52%	1%	4%	3%	0%	1%	100%
Main forecast	*2020*	*37%*	*33%*	*2%*	*10%*	*17%*	*0%*	*1%*	*100%*
Sensitivity analysis	*2020*	*44%*	*40%*	*1%*	*6%*	*7%*	*0%*	*2%*	*100%*

Taking into account deregistered vehicles and vehicles not in use, the forecast for the in-use passenger car fleet projects a fuel distribution for 2020 corresponding to that shown in Table 2. The conversion of the in-use vehicle fleet is a slow process, and the sensitivity analysis indicates minor changes in the fleet of just a few percentage points.

Table 2. Passenger cars in use by fuel type for 2016 plus forecast for 2020 (source: Transport Analysis).

	At year end	Petrol	Diesel	Electric	Electric hybrid	Plug-in hybrid	Ethanol	Gas	Total
	2016	61%	32%	0%	1%	0%	5%	1%	100%
Main forecast	*2020*	*51%*	*37%*	*1%*	*3%*	*3%*	*4%*	*1%*	*100%*
Sensitivity analysis	*2020*	*52%*	*38%*	*0%*	*3%*	*2%*	*4%*	*1%*	*100%*

The longer-term assessment is that the number of petrol-powered vehicles incorporating so-called mild hybridisation will grow markedly in the passenger car fleet, even as the share of other electric vehicles increases as well.

In the case of light and heavy lorries, we believe that a transition to alternative fuels will proceed more slowly than in the case of passenger cars, and in our forecasts we have assumed that new registrations of alternative-fuel lorries for the current year and next three years will be the same as in 2016. These vehicle fleets will be dominated by diesel vehicles over the next few years as well.

Carbon dioxide emissions, measured in grams per kilometre, for newly registered passenger cars and light lorries are recorded in the Swedish Road Traffic Registry based on their so-called type approval values, which are determined using test cycles adopted by the EU. The forecast is that average carbon dioxide emissions will decrease for both passenger cars and light lorries as a result of ongoing advances in technology and the redistribution of fuel types among newly registered vehicles. However, these forecasts entail a degree of uncertainty, as the current test cycle, the New European Driving Cycle (NEDC), used in type approvals of vehicles is to be replaced with a new method, the Worldwide Harmonized Light Vehicles Test Procedure (WLTP), to be phased in during 2017 and 2018. The values resulting from both test cycles will be entered in the Swedish Road Traffic Registry from 2017 to 2020, although the NEDC values will be determined using a simulation method. The differences between the carbon dioxide values calculated using

the two methods are unknown, and testing has been conducted only on certain car models. At the time of writing, the EU had yet to decide which values to present to consumers.

For heavy lorries, Transport Analysis has forecast how the average total weight will evolve for in-use vehicles, broken down by number of axles. The trend indicates that the number of lorries with more than four axles is increasing. The number of vehicles with two axles has essentially been decreasing 1% per year since 2007, while the number of vehicles with three, four, or more axles has increased by roughly 0.5% per year over the same period. Our forecast is based on the assumption that this trend will continue during the forecast period. Change could potentially occur more rapidly if Sweden introduces a new bearing capacity class making it permissible to drive heavy vehicles with a maximum weight of 74 tonnes for the entire rig on certain roads.[1] The average total weight is also forecast to increase within each axle-number group. Compared with 2016, the forecast indicates that the average total weight of all heavy lorries regardless of number of axles will increase by just over 3% up to 2020.

Suggestion for continued organisation

The task assigned Transport Analysis also includes offering suggestions on how the reporting of statistics and forecasts could be organised over the long term once the task has been completed. As part of this assignment, Transport Analysis has considered whether it is more appropriate for the Swedish Transport Administration or Transport Analysis to be given the task of making short-term forecasts of the development of the road vehicle fleet, assuming that such forecasts are to be made repeatedly.

This question merits further analysis and processing, but our preliminary assessment is that it would be more appropriate to assign this task to Transport Analysis. This should also include responsibility for administering and developing models appropriate for the work. In addition to providing a documented basis to the Government, the short-term forecasts could also support other agencies in their efforts to develop long-term scenarios and forecasts regarding, for example, vehicle mileage and energy use.

We suggest that Transport Analysis prepare short-term forecasts annually, with delivery at the end of April, consisting of Excel tables that include statistics and short-term forecasts for the coming three years, along with an associated methodological report describing the assessments and assumptions on which the forecasts are based, along with any methodological changes compared with previous years.

We suggest that Transport Analysis also continue to make long-term assessments in the form of prospective and recurrent qualitative analyses of technology development and the world around, as our instructions from the Government task us with conducting such analyses in the transport field. Transport Analysis also considers that it may be relevant for these analyses to have particular areas of focus.

The organisation of and work on the forecasts should be evaluated after a certain period of time.

[1] Swedish Government Bill 2016/17:112, “Freight Traffic Issues”

Transport analysis

Transport Analysis is a Swedish agency for transport policy analysis. We analyse and evaluate proposed and implemented measures within the sphere of transport policy. We are also responsible for official statistics in the transport and communication sectors. Transport Analysis was established in April 2010 with its head office in Stockholm and a branch office in Östersund.

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