

# Socioeconomic benefits related to digitalised road lists

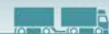
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- Analyses based on data from Statistics Norway's truck surveys for the period 2019-2022 show an increase in the average length of trucks on the road by nearly 0.5 meters and an increase in vehicle weight by 0.3 metric tons (including trailers).
- Analyses using the Norwegian freight transport model, based on changes in various versions of the road lists from 2019 to 2022, demonstrate an efficiency improvement in road transport: Road transport work increases by 3.3%, primarily due to reduced rail transport, while traffic work decreases by 2.8%.
- Changes in vehicle classes implemented between 2019 and 2022 have resulted in a transport operator and transport user benefit of approximately 1.7 billion Norwegian kroner.
- The majority of the changes took place in 2021 when main roads in the timber road network were opened to modular vehicle combinations.
- A digitization of the road lists will speed up the phasing in of changes of use by three months on average. The average gross benefit, per version of the road lists, is calculated to NOK 28 mill., or NOK 56 mill. annually

## Background

Until now, the Norwegian Public Roads Administration has published road lists twice a year, indicating the allowable vehicle sizes and maximum gross weights for public roads in Norway. The road lists are divided into four categories: Normal transport, timber transport, special transport, and modular trucks, including regulations on allowed vehicle length, axle load and gross weight for each road segment.

Modular trucks are the largest vehicles (up to 25,25 meters long and 60 tonnes of gross weight) permitted on Norwegian roads and have been allowed in limited parts of the public road network since 2008. However, as of December 21<sup>st</sup> 2020, this was expanded to include modular trucks of type 1 and 2 on most public main roads where 24-meter timber trucks are allowed, known as the timber road network, with certain restrictions in some areas.



Commissioned by the Norwegian Public Roads Administration, a digitalization of the road lists is ongoing. Among other things the digitalization aims to enable municipal and county road authorities to adjust allowed length and weight directly in a digital road network which means that they will get an overview of current restrictions in the adjacent road network. This will simplify the coordination of permitted length and weight for transportation routes across municipal and county borders and road authorities.

Interaction with end users on the road, through more precise road information, can provide better opportunities for route planning and driving with the correct vehicle weight, ultimately reducing road wear and potentially lowering the need for road maintenance for road owner.

## Purpose

In this report, we have attempted to quantify the external benefits realized through the digitization of the road lists. By examining changes in vehicle restrictions in the road network over time, we could identify how this affects vehicle size, route choice, transport costs and external costs related to freight transport.

An important element in this analysis has been the timing of the various changes in vehicle restrictions. This occurs in connection to the implementation of a new road list. In the analysis, we have used the effective date of the new road lists dating back to 2019.

## Development in the Transport Market

Based on Statistics Norway's national transport performance statistics for freight transport, we find that the railway's share of domestic inland transport work decreased by 11 percent from 2020 to 2022, reaching its lowest share since 2015. This is despite an increase in rail transport work during this period. This suggests that the growth in transport work has been even greater for road transport. This change, starting in 2021, is likely due to the opening of parts of the timber road network to modular trucks, making long-haul road transport more efficient.

To identify changes in the actual use of different vehicle sizes, regression analyses were conducted based on basic data from Statistics Norway's truck surveys for the period 2019-2022. The survey sample is drawn from the Norwegian Public Roads Administration's vehicle register, and Statistics Norway has provided technical information for each vehicle and trailer, allowing for analyses of changes in vehicle length and load weight at the times when the road lists were updated.

The main findings show an increase in vehicle length of nearly 0.5 meters. This means that the average vehicle combination on the road has increased by half a meter from 2019 to 2022. Additionally, we found that the vehicle combinations used for transport between regions and international transport are significantly longer than the average for other transport, while vehicles used for timber transport are the longest.

We also found a significant increase in vehicle weight during the analysis period, of around 0.3 metric tons. The greatest increase in weight was observed in the period after April 2019, while the largest reduction was in May 2022. Furthermore, it was found that the vehicle combinations used for interregional and international transport are significantly heavier than the average of other transport, while timber transport uses the heaviest vehicle equipment.



## Analytical framework

Analyses were performed using the Norwegian Freight Transport Model (NGM) to assess changes in permitted vehicle restrictions in the public road network in different versions of the published road lists and how this affects the use of different types of vehicles, transport costs and external costs related to the freight transport. The analysis distinguishes between three vehicle classes, each representing different vehicle classes: 1) Single trucks (up to 12.5 meters), 2) Truck/tractor-trailers (up to 19.5 meters), and 3) Modular trucks (up to 25.25 meters long), including timber trucks with long trailers (up to 24 meters).

The national model system for freight transport can be divided into a demand and a supply side, where the demand side is represented by a set of matrices for commodity flows between municipalities in Norway and between municipalities in Norway and zones abroad. The supply side in NGM is represented by cost models and network that defines physical transport supply between all zones in the system. Additionally, there is a logistics model where transport solutions are selected in a way that minimizes logistics costs for businesses.

Network data was downloaded from the National Public Road's Road Database (NVDB) at eight different time points over the period from April 2019 to November 2022. The road network for modular trucks represent the four earliest download times, while the timber road network, which is opened to modular trucks, was used for the four most recent time points.

## Modal shares and traffic work

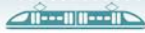
Analyses using NGM show that increases in permitted vehicle sizes gradually weakens rail transport. The most significant change occurs from April 2021, which is the first version of the road lists where national roads in the timber road network was opened to modular trucks. Transport work for rail weakens in this version by 5.6%, compared to 7.7% for the entire period. There is also a slight reduction (0.3%) in sea transport, with the majority (0.2%) occurring in the first period when national roads in the timber road network opened to modular trucks.

Road transport performance (tonne-kms) increases by 3.3% in total for the period as a result of the change in vehicle class. The majority of this change (2.5%) is attributed to April 2021. Furthermore, it is apparent that the newer versions of the road lists have, to varying degrees, reduced the use of single trucks, with the most significant shift being from trucks with short trailers to trucks with long trailers.

In summary, traffic work for the carriage of goods is reduced by 2.8%, while transport performance increases by 3.3% during the analysis period. This means that the shift from trucking with short trailers to trucking with long trailers results in an efficiency improvement in transportation, which more than offsets the shift from rail to road transport. However, the average vehicle has become larger, and the average load weight per vehicle on the road (with cargo) increases by 5.9% from 9.4 metric tons to 10.0 metric tons.

## Gross benefits

In the analysis, we have focused on gross benefits and the socio-economic effects of changes in modal shares and transport performances. This means that investment costs for the measure are not included in the analysis. User benefits are related to cost changes for transporters and cargo owners. Additionally, there are changes in taxes and fees, costs that transporters impose on society without paying for them themselves (external costs), and changes in tax costs representing the efficiency loss associated with tax collection, set at 20%.



Changes in vehicle class can both increase and reduce external costs. When the allowed vehicle sizes increase, the external costs per kilometres driven also increase, but because transportation will be more efficient, the distance driven decreases, potentially resulting in societal socio-economic cost savings. For example, measures that improve transportation efficiency will reduce the external costs related to a specific transport, but an efficiency improvement in road transport can also lead to a shift from sea or rail transport to road transport, which, in isolation, increases external costs.

In total, we find that the changes in vehicle classes implemented from April 2019 to November 2022 have resulted in benefits to transport operators and transport users of approximately 1.7 billion Norwegian kroner. The majority of this (nearly 1.1 billion) comes from the changes when parts of the timber road network were opened to modular trucks.

By digitalization the road lists, the change in vehicle class is implemented at an earlier stage. In total, for the entire period, digitization would have resulted in a total gross benefit of 430 million Norwegian kroner. The majority of the benefit is related to the fact that national roads in the timber road network were opened to modular trucks, which is a one-time benefit that cannot be repeated in the future.

For other years, there is a wide range of gross benefits, ranging from 0.5 million for the change that occurred in May 2020, up to 40 million kroner due to the changes that occurred in October 2021 and May 2022. The average benefit, excluding the one that occurred in April 2021, is 28 million kroner per version of the road lists, or 56 million kroner per year. If the entire timber road network had opened to modular trucks, this would have resulted in gross benefits equivalent to nearly 50% of the benefits calculated for the period from 2019 to 2022.