TØI report 924/2007
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Oslo 2007, 59 pages Norwegian language

Summary:

Sensitivity analysis of the travel demand forecasts in the Norwegian National Transport Plan 2010-2019

The base forecast for travel demand in the National Transport Plan 2010 – 2019 was completed June 2007, and the results are based on calculations from the Norwegian National Transport Model and the five regional transport models. This report contains sensitivity analysis of the base forecast for 2020 and an evaluation of several different future scenarios regarding traffic volume, passenger kilometres and emissions of CO_2. The results are compared with the Government's White Paper No. 34 (2006-2007) concerning Norwegian climate politics.

This white paper contains concrete objectives concerning reduction of CO_2 emissions in Norway for various industrial fields. The Norwegian government's objective for the transport area is to reduce annual emissions of CO_2 by 2.5 – 4 million tons within 2020 compared to the reference level.

The reference level is drawn up by the Norwegian Pollution Control Authority. They predict a traffic growth of 62 percent and efficiency improvements of one percentage point per year. The efficiency improvements are mainly connected to technology development reducing the rate of CO_2 emissions from motorized vehicles.

There are no official Norwegian figures on how the unit rate of CO_2 emissions from motorized vehicles will evolve in the coming years. In fact the latest figures from Statistics Norway on CO_2 emissions pr passenger kilometre for all the principal means of transportation such as boat, bus, private car, aircraft and rail, are from 1998.

In this project we have extrapolated the factors for CO_2 emissions pr passenger kilometre from 1998 to 2020. In our extrapolations, the CO_2 emissions pr passenger kilometre from private cars will be reduced by almost 32 percent, while the reduction from busses and aircraft are estimated to be 25 and 23 percent, respectively. We expect the 2020 CO_2 emission factors for sea and rail transport to be the same as in 1998.

The base forecast for travel demand in the National Transport Plan 2010 – 2019 shows an overall growth in passenger kilometres of about 17 percent. This includes an increase of about 18.5 percent in passenger kilometres by private car and about 24 percent by air transport. The results presented in this report is based

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mainly on the same transport models, input files and general assumptions as the base forecast for passenger transport, and therefore the results are quite similar.

Based on the traffic growth from the base forecast for passenger transport and the extrapolated CO_2 emission factors for 2020, the emissions of CO_2 from passenger transport will be 6 percent lower in 2020 compared to 2006. This is significantly less than the reference level in Government's White Paper, suggesting that the Norwegian government's objective for the transport area will be achieved without further means.

However, if one choose to use the base forecast for passenger transport as the reference level, converting the government objective under the assumption that the new objective should be similar regarding relative reduction of CO_2 emissions, and also assuming that freight transport and other transport areas will be subject to the same requirements as passenger transport, the reduction objective for passenger transport will be about 0.7 – 1.2 million tons CO_2. This report concludes that CO_2 emission reduction of such a magnitude presupposes an increase in the cost of car use equivalent to doubling the price of fuel.

A policy instrument like doubling the charge in the toll rings around four of the biggest Norwegian cities, and reintroducing a toll ring with double charge in a fifth city, will only reduce CO_2 emissions by 1.3 percent.

Considerable improvements in rail network and level of service only amounts to a marginal reduction in CO_2 emissions, even if electric trains are considered to be free from CO_2 emissions, while considerable improvements in the trunk road network only lead to a slight increase in CO_2 emissions.

Reduction of public transport fares also seems to have small effect on CO_2 emissions from passenger transport. When reducing public transport fares, some travellers will switch from car to public transport, leading to a decrease in car use and a decrease in CO_2 emissions. But others will switch from walking and cycling. A reduction of fares will also result in many new travellers, hence the net effect will be small and very dependent on how the public transport companies deal with the increase in demand.

The majority of passenger kilometres is related to private cars, and private cars are by far the most important contributor to CO_2 emissions from passenger transport. These results suggest that a significant reduction in CO_2 emissions requires a considerable increase in the cost of private car use. Reduction in CO_2 emissions from passenger transport is mainly related to mobility reduction. The potential for reducing CO_2 emissions by getting travellers to switch from private cars to public transport seems to be limited. Efficient instruments for reducing CO_2 emissions from passenger transport are effective because they reduce travel demand.

The travel demand elasticity seems to be a bit higher in the Regional Transport Models compared to empirical studies, hence the effects from policy instruments like reducing fares on public transport and increasing costs of car use might be a bit lower in real life than suggested by our calculations. The elasticity of demand

for public transport in the National Transport Model, however, seems to be a bit low compared to empirical studies, but because the Regional Transport Models cover more than 98 percent of the total amount of trips, the overall effects are believed to be a bit in the high side for all modes except air transport, which is calculated only in the National Transport Model.