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Measures for reduced CO_2-emissions from freight transport in the Nordic countries

Inger Beate Hovi, Institute of Transport Economics (TØI), Norway, ibh@toi.no
Daniel Pinchasik, Institute of Transport Economics (TØI), Norway, drp@toi.no
Anna Mellin, Swedish Environmental Research Institute, anna.mellin@ivl.se
Inge Vierth, Swedish National Road and Transport Research Institute (VTI), inge.vierth@vti.se
Heikki Liimatainen, Tampere University of Technology, Finland, heikki.liimatainen@tut.fi
Niels Buus Christensen, Institute of Transport Economics (TØI), Denmark, nbk@toi.no
Grétar Ævarsson, Institute of Transport Economics (TØI), Norway, gae@toi.no

Abstract

Although there is an international obligation to reduce GHG from the transport sector by 2030, it appears that emissions, especially from heavy transport, continue to increase. In a project financed by NORDEN (Nordic Council of Ministers), measures for CO_2-emissions from freight transport in the Nordic region, with emphasis on road transport, will be reviewed.

The Nordic countries have quite a variety of freight transport patterns, linked to the different business structure, geographic conditions and infrastructure. Therefore, different use of instruments in this area can have different impacts. Emphasis will therefore be placed on a comparative analysis of means in the Nordic countries for reducing emissions from road transport and transfer of freight from road to rail and sea (modal shift). This analysis will cover the full range of instruments: economic (as fees), technical (as emission standards) and other means to stimulate technological development that reduces CO_2 -emissions per tonne km, as well as transport and land planning.

The project will start in March 2018 and should be finished in August. Therefore, the results are not available yet, but will be presented as a new analysis at the conference.

Background

Both passenger cars and goods transport by road are significant causes of CO_2-emissions in the Nordic countries. Although the share of passenger cars in these CO_2-emissions is higher and as such offers a larger potential for CO_2-emission reductions, it is also this segment where policy measures in recent years have started to have an effect on both emission levels and growth rates. For goods transport by road, of environmental policy measures like Euro class prescriptions, environmental zones, time-based road charges, carbon taxes, and measures regarding alternative fuels, and the use of longer and heavier trucks,

only the latter three currently have a form of direct focus on reducing CO_2-emissions from heavy goods vehicles.

In a project financed by Nordic Council of Ministers, existing policy measures for reducing CO_2-emissions from road transport in the Nordic countries will be reviewed. The focus will be on differences in policy design and development in the freight transport market in each of the Nordic countries, giving insight into how the different countries work to achieve political objectives such as to meet targets for GHG emission reductions. Attention will also be given to measures directed at transferring goods from road to rail and waterborne transports.

The project will start in March 2018 and should be finished in August. Therefore, the results are not available yet, but will be presented as a new analysis at the conference.

Method and structure

The backbone of the analysis will consist of a literature and data review for the individual Nordic countries and relevant EU policy requirements. Provided that the required information is available for a country through existing sources, a comparable overview will be given of:

1. Climate objectives and targets
2. Developments in CO_2-emissions
3. Developments in transport and traffic volumes
4. Policy measures aimed at reducing CO_2-emissions from goods transport by road. This should cover, amongst others:
    a. A comparison of physical external conditions like vehicle length, max. gross vehicle weight, etc., in the different countries
    b. Economic measures, technical measures, and other measures for reducing CO_2-emissions per tkm.
    c. Background (e.g. year of implementation, level, scope) and as far as possible, information on costs/effectiveness.
    d. A paragraph on the use of biodiesel (extent of (mandatory) use and prospects in every country, e.g. mandatory 20% blend of biodiesel from 2020 onwards)
    e. Fiscal measures, legal measures, organizational measures, communicational measures
5. Modal shifts and their potential for emission reductions.
6. Discussion of (partially) counteracting or conflicting policies

Previous and ongoing activities in the Nordic Countries

Much of the relevant transport and environmental policy in the Nordic countries is driven or influenced by objectives and developments at the EU-level. In addition to discussing these, and as the project study to a considerable extent will be based on literature and data reviews, this section shortly outlines existing work and ongoing activities in each of the Nordic countries.

Norway

For Norway, general information (e.g. developments in emissions, transport performance, etc.) is collected through Statistics Norway (SSB). This is supplemented with information from a so-called broad goods analysis (Bred samfunnsanalyse av godstransport), for which TØI, in cooperation with others, wrote ten reports as input (see references). These reports serve as a knowledge base for the Norwegian National Transport Plan 2018-2029 and together provide a broad coverage of the structure and developments of the transport and logistics markets. Amongst others, the reports cover economic and physical external conditions for different goods modalities, and competition between these, the use of different transport modes in certain geographical areas, transport prices and cost structures, potential for goods transfer from road to sea and rail, e.a.

In addition to other work by TØI, the Office of the Auditor General of Norway has working on a management audit regarding Norwegian Government efforts to achieve objectives for the transferring of goods from road to other modes of transport. The results from the study was presented 27th of February this year. TØI provided statistics and analyses on developments in transport volumes and modal splits for different submarkets to the analysis, and therefore have fully access to up to date data of highly relevance.

The Norwegian Environment Agency (2015) and Norwegian Green Tax Commission (2015) discuss relevant emission projections and extensive assessments of possible measures, while a recently published Government strategy (2017) outlines how 2030 climate objectives are to be achieved.

Finally, a TØI report (and scientific publication) assessing the introduction of a so-called CO2-fund, includes information on transport and emission developments, as well as an assessment of costs, effects, and effectiveness of phasing in different emission reducing technologies on heavy trucks (biodiesel, biogas, hydrogen, electricity).

Sweden

In Sweden, the official statistics on transport and emissions are provided by Trafikanalys and Naturvårdsverket respectively. The source for official emissions data from road transport comes from HBEFA[1] modelling operated by IVL. Trafikanalys (2015), Trafikverket (2016), Energimyndigheten (2017) and Naturvårdsverket show that decreases in emissions have slowed down since 2008. Generally, there is an increase of the gap between the current trend and both stated national environmental objectives on climate change and objectives regarding a fossil independent vehicle fleet by 2030. For that reason, the implementation of new, and extension of existing measures is discussed.

Some of these policy measures are:

- the use of longer and heavier road vehicles or high capacity transport up to 64 tonnes and 25.25 metres. Heavier vehicles (up to 74 tonnes) have been approved recently, but are not yet implemented due to discussions on where in the road network they are allowed to operate – see e.g. Ericson et al. (2010), Yaramenka et al. (2014), Trafikverket (2016b), and Sveriges Riksdag (2017).
- platooning and electric roads for heavy traffic, so far consisting of case and pilot/feasibility studies, e.g. E-road Arlanda and Elväg Gävle (VTI, 2017 and Kristoffersson et al., 2017). According to Trafikanalys (2017b), future automated platooned road transport with long vehicles can operate at higher costs than current rail transport, but at lower costs than traditional road transport.
- building of the networking organization Fossil Free Fuel (f3) provides a broad source of knowledge for industry, governments and public authorities in their strategic planning (Fossil Free Fuel f3, 2017).
- building of the network KNEG (Klimatneutrala Godstransporter på Väg). Private and public stakeholders adopted this joint initiative to reduce CO2-emissions from Sweden's goods transports (KNEG, 2017).
  a premium for the purchase of environmental trucks and the inclusion of freight transports in the environmental agreements in cities (stadsmiljöavtal, IVL and Koucky & partners, 2017)

With regards to modal shifts, some policy measures that have been discussed are e.g.:

- a distance-based tax (implies discontinuation of the current time-based road charge, which indirectly affects CO2-emissions and has not been accepted by the Swedish government) – e.g. SOU (2017) and Vierth et al. (2017).
- An ECO-bonus system, incentivizing shifts to shipping (Trafikanalys, 2017d).

[1] HBEFA = **Handbook emission factors for road transport, http://www.hbefa.net/e/index.html**

Finland

In Finland, there are two major sources of information on the development of road freight and emissions thereof. VTT's LIPASTO transport emission database is used as the source for official emissions data in Finland. LIPASTO estimates the emissions based on road side traffic counts by Finnish Transport Agency. The other source is the continuous goods transport by road data by Statistics Finland. Tampere University of Technology has for years enhanced this data with fuel consumption and emission estimates and used this dataset in a variety of studies analysing the development of road freight sector in Finland. This methodology was also used in Sweden, Norway (by TØI) and Denmark in a study for NORDEN within the project "Nordic comparison on the future of road freight energy efficiency and CO_2 emissions - NORFREN[2]". Based on the methodology Tampere University of Technology is currently evaluating the costs and benefits of 76 tonne high capacity vehicles, which were allowed in October 2013 in Finland. Furthermore, the experiences of using 60 tonne vehicles in Finland are currently used to estimate the potential of 60 t / 25,25 m vehicles in the United Kingdom in collaboration with Heriot-Watt University and Cambridge University and their Centre for Sustainable Road Freight (www.csrf.ac.uk).

Tampere University of Technology has also recently completed two studies for the Finnish Climate Panel on the cost efficiency of CO_2 mitigation measures in road freight transport and transport as a whole. Scenario tools for estimating the emissions in 2030 and 2050 and the effect of various measures on the emissions have been developed in these studies. The scenario tools are currently developed further within a project on the effects of digitalization, automatisation and electrification on everyday transport of people and freight (the project is funded by the Kone Foundation).

Denmark

In Denmark, the main source for statistics on transport volumes by road is the Road Directorate's Statistics catalogue and the Landstrakfik model by the Danish Technical University (DTU), while transport-related CO2-emissions and projections given existing policy are dealt with in base projections by Energistyrelsen. The Danish government is currently preparing a national plan for meeting Denmarks non-ETS targets for CO2-reduction for 2030. This plan is to be released by the end of this year. As input, the Danish Climate Council was asked for recommendations. In its recent report, the only freight transport related recommendation from a cost-effectiveness point of view is the promotion of compressed natural gas (CNG) as preparation to biogas in a longer 100% renewable energy perspective.

Other sources, such as Energistyrelsens Virkemiddelkatalog, cover the (reduction) potential and costs of a broad set of different CO2-reducing measures, including for (freight) transport. This information can serve as helpful input when analysing gaps between CO2-reduction practice and targets. Further, Ea Energy analytics published a 'Green Roadmap' for the transport sector towards 2030, in which different measures and scenarios are related to climate targets. The Danish Society of Engineers (IDA), in turn, published an Energy Vision for 2050, in which the transport sector is also covered extensively.

When it comes to achieving modal shifts away from road, an extensive study for promoting rail transport is done by Transportstyrelsen. With regards to actual initiatives to reduce emissions from freight transport, Denmark largely follows EU regulations and strong competition for optimal logistics and energy efficiency. In addition, several demonstration projects and pilot schemes have in recent years received public funding, e.a. towards the use of longer and heavier trucks, the use of biogas, and city logistics.

[2] http://www.nordicenergy.org/project/nordic-comparison-on-the-future-of-road-freight-energy-efficiency-and-co2-emissions/

Iceland

For Iceland, information on transport, traffic, and emissions, is available at considerably less detailed levels than for the other countries (after checking with the Icelandic Statistics Agency (Hagstofa), Transport Authority (ICETRA) and the Road and Coastal Administration (IRCA).

Iceland will therefore be included in a more general way than the other countries and only bring Iceland where appropriate, including comparing external conditions.

Expected results

The fact that both traffic volumes and CO_2-emissions from freight transport have increased and are still expected to increase significantly in coming years, indicates that existing policy measures will not be sufficient to achieve climate objectives; on the contrary, at the current rate, considerable gaps remain between CO_2-emission levels in practice, and CO_2-emission objectives, for all of the Nordic countries.

Existing measures are to be related to objectives regarding CO_2-emissions in the different Nordic countries, followed by a discussion of costs and effectiveness, remaining CO_2-emission reduction gaps, and recommendations to fill these gaps. For the Nordic region, the aforementioned elements will also be brought together in a comparative analysis, which is expected to lead to additional policy insights.

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