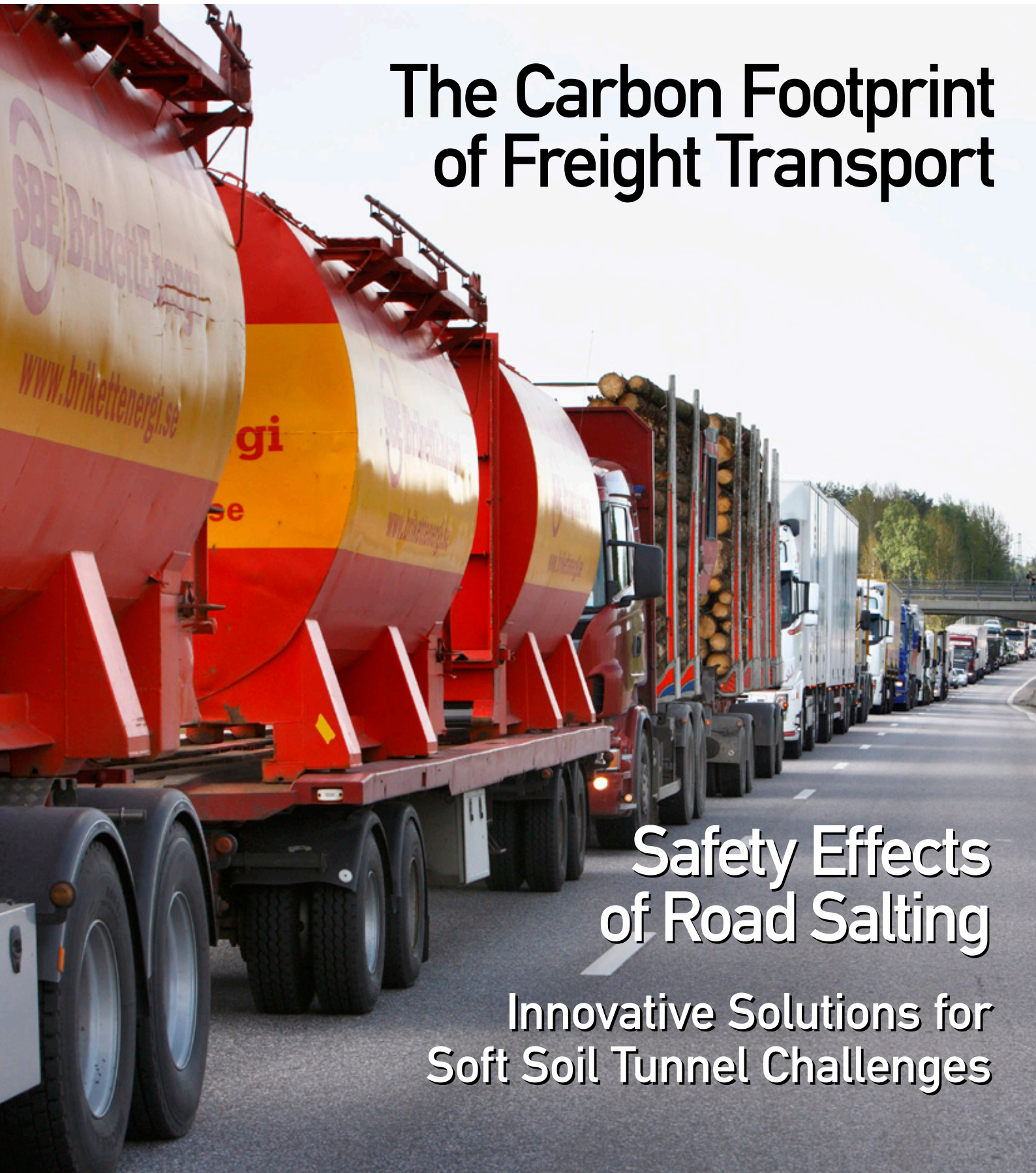
NORDIC
ROAD AND TRANSPORT RESEARCH | NO.1 2012
WWW.NORDICROADS.COM



The Carbon Footprint of Freight Transport

Safety Effects of Road Salting

Innovative Solutions for Soft Soil Tunnel Challenges

Contents

Editorial Notes

Nordic Road & Transport Research is a joint publication of six public road and transport research organisations in the Nordic countries, Denmark, Finland, Iceland, Norway, and Sweden. The main objective of the publication is to disseminate research results and news from the institutions, especially to researchers and decision makers. Each institution is responsible for the selection and presentation of the material from its own scope of activities.

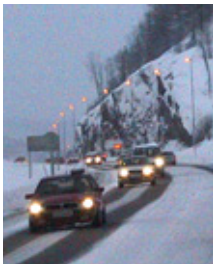
Nordic Road & Transport Research is published two times a year. It is sent out, free of charge, to recipients selected by the six joint publishers. Free sample copies are also sent out on special request.

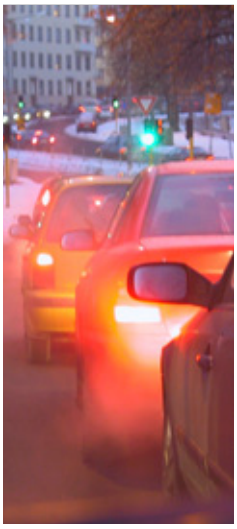
If you have questions about the contents of the publication, please write to the author or to the respective publishing organisation.

Requests from readers outside the Nordic countries for back issues, and notification of address changes is handled by the Editor-in-chief at VTI, the Swedish national road and transport research institute, in Sweden. Readers in the Nordic countries: please contact the publishing institution of your country.

Contact: see back cover.

GRAPHIC DESIGN
Forma Viva, Linköping, Sweden
COVER Hejdlösa Bilder, Linköping
ISSUE 3,900
ISSN 1101-5179
WEB www.nordicroads.com






Via Nordica 2012

Where in the World Is Common Sense?

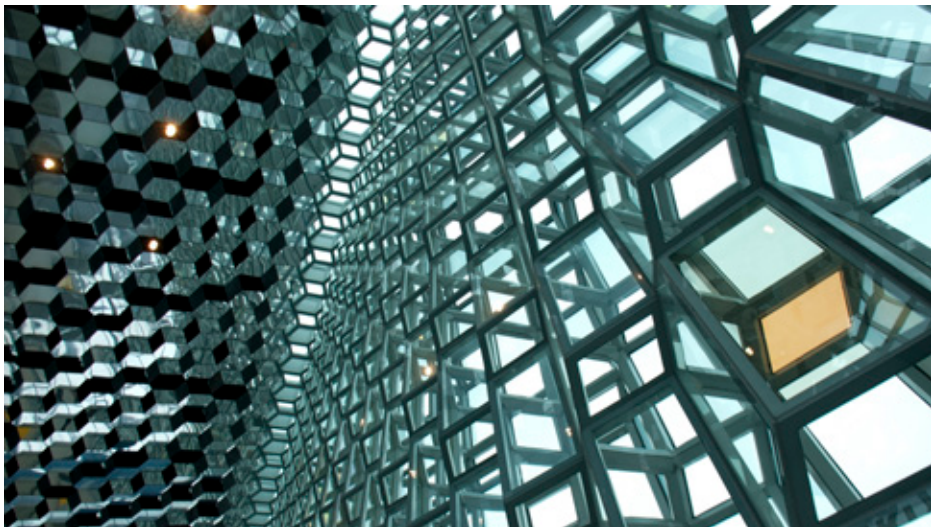


Photo: G. Pétur Matthíasson

The glass facade of the concert and conference hall Harpa where Via Nordica 2012 will be held, is designed by the Icelandic born Danish artist Ólafur Elíasson.

As it happens, it might be that one could find common sense in Reykjavík, Iceland, in June this year. Between June 11–13, to be precise. This question will be addressed at the Via Nordica 2012 road conference opening plenum session in the brand new Harpa conference house. The Swedish historian and diplomat, Gunnar Wetterberg, and the Icelandic doctor of philosophy, Páll Skúlason, will ponder how decisions are made, who takes them and why, and of course if there is any sense in what road authorities are doing. After that there will be a panel discussion between them and Elizabeth Deakin, professor at UC Berkeley, Ingemar Skogö, the Swedish County governor and former General Director and Ögmundur Jónasson, the minister of the Interior in Iceland.

Via Nordica 2012 – At a crossroads – conference is held by NVF, the Nordic Road Association. The organizers hope the opening plenum's debate will give a good start to a great conference. This is the first time it is held in Iceland in its more than 75 year history. As hinted in the conference title, At a crossroads, we will be looking at the future, at self driving cars – the audience will hear Paul Rojas' view that today´s cars are yesterday´s horses. Paul Rojas is professor at the Free University of Berlin.

The 16 technical committees of NVF will also, in four parallel sessions, cover four years of work since the latest Via Nordica conference in Helsinki, Finland 2008. At the conference the visitors will also be able to use smartphones and computer tablets as well as laptops to follow conference events and read news from the conference. This will be a step into the future, the organizers hope.

Be welcome to the 21st Nordic Road Congress in Reykjavik this year. Registration is open at the website of Via Nordica 2012.

Contact: G. Pétur Matthíasson, gpm@vegagerdin.is
More information: www.vianordica.is
www.nvfnorden.org

Save the Date for Strait Crossings 2013

The 6th International Symposium on Strait Crossings – Extreme Crossings and New Technologies – will take place 16–19 June 2013 in Bergen, Norway.

Straits and sounds, as well as inlets and fjords, are barriers for road and rail transport. These barriers can be overcome using fixed links or ferries. Strait crossings greatly influence transport costs and impact social development, the environment and the total energy consumption, as well as traffic safety issues.

The symposium is organised by the Norwegian Public Roads Administration and the Norwegian Society of Graduate Technical and Scientific Professionals.

Here are the dates to note:
Abstract submission: 1 November 2012
Abstract acceptance: 15 January 2013
Submission of papers: 15 March 2013
Paper acceptance: 30 April 2013
Completion of symposium proceedings: 31 May 2013.

Photo: NPRA

Illustration of a floating bridge conceptualised for the Coastal highway E39 project, Norwegian Public Roads Administration.

Contact: Siri Engen, siri.engen@tekna.no
More information: www.SC2013.no

Road Safety on Four Continents – Conference in Beijing 2013

The 16th conference Road Safety on Four Continents will take place in Beijing, China, 15–17 May 2013 in a co-arrangement between VTI, the Research Institute of Highway and the Beijing University of Technology. For more information, please visit the VTI website.

Date: 15–17 May 2013 in Beijing, China
More information: www.vti.se/RS4C

Improved Transguide Makes Research Easier

An updated version of Transguide was recently launched. The new website has an improved design and structure but, just as before, the contents are quality checked by the VTI Library and Information Centre (BIC).

–Transguide has been redesigned from scratch. The structure has been improved and search results are presented in a simpler way than before. The right information can be found easier on the new website, says Birgitta Sandstedt, Head of BIC.

– Now, of course, we wish to receive feedback from our users, she adds.

Transguide is a website that collects and disseminates information in the field of transport research. The website contains information on traffic, transport users, vehicles, transport and infrastructure from several different aspects. It is intended to be used primarily by researchers, investigators, consultants and officials, but also by journalists, students and the general public.

BIC has the responsibility for providing and disseminating information and knowledge within the area of transport research in Sweden. As a part of this responsibility, BIC runs and develops Transguide.

Katarina Ljungdahl, VTI

Website: www.transguide.org Contact: bic@vti.se

Photo: Harald Aas

Safety Effects of Road Salting

The effects of road salt are greater for less serious accidents (material damage) than for accidents with personal injury.

Road salt is used in Norway in winter road maintenance to improve safety by increasing friction on icy roads.

Torkel Bjørnskau
TØI, Norway

Given the adverse environmental effects of using road salt, it is important to know that the assumed safety effects are realised.

Many studies both from Northern Europe and North America indicate that road salting reduces the number of accidents, but the reported effects are larger in older studies. The effects are also greater for less serious accidents (material damage) than for accidents with personal injury.

The use of road salt should also be informed of by important contextual factors. For instance, the increase in accident risk when driving on snow or ice-covered roads is greater in those areas where such driving conditions are encountered less often.

Furthermore, road salting leads to better friction and thus increased speed. One is therefore faced with two optimization issues: what is the increase in risk on the remaining or surrounding unsalted snow or ice-covered roads when salt has been used on parts of the road network? And, does the speed increase as a result of road salting also increase the number of more serious road accidents?

Norwegian studies of the effects of road salting are old and need updating, not least to account for the above optimization issues.

Contact: Torkel Bjørnskau, tbj@toi.no
Full report: TØI Report 1171/2011, link can be found at www.nordicroads.com (written in Norwegian with an English summary)

EPAM Sweden 2012

Meet the Challenges of Road Infrastructure Asset Management in September

In a few months the 4th European Pavement and Asset Management conference, EPAM, is to be held in Malmö, Sweden. The conference will cover all aspects of the road infrastructure including assets such as pavements, engineering structures, and road equipment.

Date: 5–7 September 2012 in Malmö, Sweden
More information: www.vti.se/epam4

Photo: NPRA

The tunnel is being constructed through quick clay in an historical part of Trondheim, Norway.

Innovative Solutions for Soft Soil Tunnel Challenges

Anders Beitnes, NPRA, Norway

Harald Inge Johnsen, NPRA, Norway

A new highway connection in eastern Trondheim is being constructed under challenging conditions. A 2.5 km twin-tube four-lane tunnel is being built through the hillside between the district of Strindheim and the harbour area. At the western end the rock tunnel ends in a 350 metre cut and cover through soft soil.

The project poses an impressive set of challenges. A 100 metre stretch of the tunnel is being constructed in extremely sensitive quick clay. This is also where the tunnel will pass about 20 metres below traditional residential houses from the 1880s, in a section of Trondheim that is protected due to its valuable cultural heritage. Five houses had to be moved temporarily to make way for the project. To preserve the foundations and the infrastructure, surrounding soil must not lose pore pressure below certain limits, and during excavation and back-fill, the inward deformation of pit walls must not exceed 20–30 mm.

Watertight diaphragm wall

After a comprehensive planning period, during which a wide range of methods was considered, a procurement process using competitive dialogue followed. NCC was awarded the contract to construct a diaphragm wall in the quick clay zone employing a new method developed by Rautaruukki Corporation.

First 600 millimetre steel tube sheet piles with front end, over-sized, studded drill-rings are vibrated into position. A DTH pneumatic hammer then grips into the drill-ring and provides a 1.5 metre deep foundation drilled into the bedrock. The asymmetric "footprint" of the sheet pile wall can later be grouted with pressure to seal the interface. Inclinometer measurements have shown this interface to provide considerable stiffness and strength against both shear and bending. During this process, only 13 of the 320 tube piles were not successfully entered into the bedrock. These 13 spots had to be supplemented by jet-grouting as a sealant on both the inner and outer side at the foot.

After the walls were in place, all soft soil both at excavation levels and below (down to a depth of 23 metres) was treated with lime and cement piles. During excavation, the diaphragm walls were supported by inner struts, as no drilling of retainer anchors through the quick clay was allowed. A grouted cut-off curtain penetrates 10 metres into the bedrock, using micro-cement and colloidal silica. During and after excavation some small leakages have occurred, mainly at spots where drilling into rock failed. For most of these spots polyurethane grouting has been used to stop leaks.

Low heat concrete

The concrete tunnel will be cast in place, with rebar-reinforced, 1 metre thick walls. By keeping the temperature low and by casting one more time, long, fissure-free and watertight concrete is ensured. Low temperatures are achieved by replacing 40 per cent of the Portland type cement with fly-ash pozzolane and keeping the pasta level low.

Every 15 metres along the tunnel, watertight joints accommodate the inevitable dislocation and movement of the tunnel. External and central waterstops ensure watertightness, and space has been accommodated for post-installation of a third gasket.

The tunnel is scheduled to open for traffic in 2014.

Contact:
Harald Inge Johnsen, harald.johnsen@vegvesen.no (Project manager)
Anders Beitnes, anders.beitnes@vegvesen.no

A Large Number of Drink-Driving Accidents on Minor Roads

Susanne Gustafsson,
VTI, Sweden

An average of between 70 and 80 alcohol- and drug-related fatal accidents occured each year in Sweden during the years 2006–2009. In a recently finalised study, VTI has identified that the majority of the accidents occur on minor roads.

Photo: Hejdlösa Bilder

–We can see that there is a significantly higher risk of being killed in an alcohol-related traffic accident on so-called ordinary roads, i.e. 2-lane single carriageways with no central reservation. Within ordinary roads, alcohol related accidents are more common on roads with speed limit 60–70 km/h than on roads with speed limit 80–100 km/h, says Susanne Gustafsson, analyst at VTI.

Most fatal accidents on ordinary roads occur on roads which are known as second-class and third-class county roads being therefore relatively small roads.

The study also notes that the majority of alcohol-related fatal accidents occur at night and mainly involve young drivers under the age of 25.

The study will serve as a basis for the police when devising strategies and plans to monitor drink-driving.

Katarina Nestor, VTI

Contact: Susanne Gustafsson, susanne.gustafsson@vti.se
Full report: VTI notat 14-2012, can be found at: www.nordicroads.com
(written in Swedish with an English summary)

Photo: Hejdlösa Bilder

Right in the Middle of Vision Zero's Blind Spot

Cyclists and pedestrians suffer the most from serious injuries in road traffic accidents

Vision Zero has had good results in Sweden, but in the case of serious injuries there is still a long way to go before the problem of road traffic accidents is resolved.

Around 8,000–9,000 people a year suffer serious injury in road traffic accidents in Sweden. Unlike the number of deaths in road traffic accidents, where most of those affected are motorists, around 30 per cent of those seriously injured are pedestrians. One in four are cyclists.

– Although Vision Zero is successful, some groups of road users have been overlooked. Focusing solely on the number of deaths provides a distorted view of road safety, says Hans-Yngve Berg from the Swedish Transport Agency.

There is a risk that the good results achieved by Vision Zero may mean that measures to improve road safety are scaled down. Hans-Yngve Berg points out that accidents in which people suffer serious injuries are just as serious a problem, particularly when looking at the economic aspects. The problem is that the strategy currently does not include unprotected road users. There is a need to change the focus of our approach to preventive measures.

Katarina Ljungdahl, VTI

Full article: www.nordicroads.com

Photo: Harald Aas

A Toolbox for Policy Packaging and Policy Implementation

Nils Fearnley,
TØI, Norway

The final report in the EU research project Optic (Optimal policies for transport in combination) offers a toolbox for policy packaging and policy implementation in the form of different factsheets.

The project's main objective is to give guidance for design and implementation of optimal transport policy measures and to reduce adverse effects and/or provide positive synergies.

Policy in successive stages

Six stages of the policy process are identified. The factsheets give practical and general advice for each of these stages:

1. **Definition of objectives and targets:** First the objectives and targets of the policy intervention must be defined. The more concrete these definitions are, the more tangible their assessment in later stages can be. Ideally, targets are connected to specific target values, or indicators. If objectives and targets remain vague, it becomes difficult to define suitable and effective policies.
2. **Create an inventory of possible policy measures:** Once objectives and targets have been agreed upon, an inventory of suitable measures can be set up. Each of these measures must be evaluated with respect to acceptability, effectiveness, efficiency, potential barriers and their causal relationship to other measures. The output is a decision on one or more primary measures that function as the core foundation of the policy package.
3. **Assessment of policies and policy package:** The primary measure is assessed here, with the aim to predict in as much detail as possible impacts and to quantify effectiveness.
4. **Expansion of package and amendment of measures:** If the primary measure is considered insufficient in any respect, further ancillary measures can be supplemented into a policy package. Based on further assessment (stage 3), the policy package can be further refined. This process iterates until a satisfactory output is reached.
5. **Implementation:** Implementation of policy packages will often run into numerous barriers. Consultation of stakeholders through "open house meetings" or "dialog seminars" can be useful to solve problems.
6. **Monitoring and evaluation:** Once the package has been implemented, the effects must be monitored and evaluated and, if necessary, corrective actions taken.

Tools for policy assessment

In addition, the report explores in further detail indicators and tools for the assessment of policy packages; the management of barriers; and issues of transferability.

In real life, the boundaries between the stages are evidently not that clear and, importantly, a policy packaging and implementation process does not necessarily follow any fixed order.

Besides implementation, stages three and four (assessment and amendment) are likely to be the most demanding with regards to necessary time and resources. However, careful work in stages one and two (defining objectives and creating inventory) will help improve the whole packaging process.

The recommendations in the report are based on theoretical elaborations and empirical evidence analysed in the Optic project.

Contact: Nils Fearnley, nils.fearnley@toi.no
Link to full report: www.nordicroads.com

The AttenD System Helps Drivers Keep Their Eyes on the Road

In an extensive field study, VTI and Saab have developed a system that warns when the driver is inattentive. At present, the AttenD system requires two cameras, but research into new solutions may mean that in future one camera will be enough to detect whether the driver is distracted.

The AttenD warning system is based on the principle that a driver must not look away from the traffic for too long or too often. The system takes into account long individual glances away from the road and also the driver's visual behaviour over a longer period. A longer period is relevant because repeated looks away from the road have a greater detrimental effect on driver performance when compared with a single averted look which is of the same length as one of the repeated looks.

The AttenD system uses two cameras that monitor the driver's head and eye movements. In conjunction with parameters such as speed and steering wheel movements, the system evaluates the driver's attention level. When AttenD detects that the driver seems distracted, the system issues a warning in the form of vibrations in the driving seat.

– Building up a system of coordinates inside the car which provides an accurate, three-dimensional view of reality requires at least two cameras.

For research purposes, where the system must be extremely precise, the current version works well, but in a commercial system it is important for financial reasons for the AttenD algorithm to be modified so that one camera is sufficient, says VTI researcher Katja Kircher.

Saab is currently working with Autoliv to find out how the system could be designed to work well even when only one camera is used.

Katarina Ljungdahlm VTI

Contact: Katja Kircher, katja.kircher@vti.se
Full article: www.nordicroads.com

More Efficient Transport with ITS

Terje Reitaas,
NPRA, Norway

Construction is not the sole solution to problems in the transport sector. Intelligent Transport Systems (ITS) have provided us with some promising means of solving transport challenges in Norway. The Norwegian Public Roads Administration (NPRA) has recently embarked on a new R&D programme, Smarter Road Traffic with ITS, to find out how ITS can be used more effectively. The programme will run for six years, until 2018, in parallel with the EU ITS action plan.

The main goals of the programme are to:

- Ensure optimal use of the existing transport infrastructure.

Photo: Anne Marie Norheim

- Increase the efficiency of NPRA internal processes through innovation.
- Improve the quality of data used by the private sector.
- Develop a competitive supplier market.
- Support ITS research at research institutions.
- Increase ITS competence within the NPRA and throughout the road transport sector.

Strategies for collecting data

The R&D programme will pursue a broad range of activities in order to reach these goals. A number of ITS systems are already implemented in the Norwegian transport network, and these systems collect a vast and increasing amount of data. The projekt Smarter Road Traffic with ITS will look into different strategies for collecting, refining and presenting this data. Existing ITS measures will also be evaluated. The NPRA needs to have a clear picture of their effects, which will provide valuable input when a more comprehensive ITS strategy is to be developed.

Open standards

One of the challenges is that there are several incompatible ICT platforms available on the market. To ensure an open and varied array of suppliers, the R&D programme will address the issue of open standards and work towards building a consensus around these platforms.

The R&D programme aspires to be at the forefront in national and international R&D in the field through involvement in international research projects and programmes.

One of the main priorities will be to facilitate the implementation of ITS and research projects across the field. These projects, which pursue goals within traffic safety, reduced travel time, access and mobility, will also be used to develop methods for evaluating ITS measures. The projects will be designed not as pilot projects, but as permanent activities.

Contact: Terje Reitaas, Programme manager,
terje.reitaas, vegvesen.no

Photo: Einar Gíslason

White spirit is an evaporable solvent, which is harmful to the environment and unhealthy for road workers in the surface dressing process. Other problems associated with the use of white spirit are asphalt-bleeding and the loss of stone chippings.

Bio-Oil Used with Asphalt for Surface Dressing

Gunnar Helgi Guðmundsson, ICERA, Iceland

Since the surface dressing of Icelandic roads first started, white spirit has almost exclusively been used to dilute the asphalt. In 2009, laboratory studies were performed to explore whether bio-oil from fish oil could be used as an asphalt binder. The results exceeded expectations and in 2011 all surface dressing was executed with bio-oil or rapeseed-oil. It is expected that by the year 2012, only bio-oil will be used.

In the surface dressing process it is necessary to dilute the asphalt to make it easier to work with and to ensure a better coating of the stone material. Initially the asphalt used to be mixed with 18 per cent white spirit, but it was gradually possible to reduce that percentage down to 9 per cent. Generally speaking, the annual use of this thinner ranges between 700 000–800 000 litres.

In 2006 and 2007, preparations began to phase out the use of white spirit from the surface dressing process. In order to get rid of undesirable effects on the environment and road workers, the focus shifted to diluents that do not evaporate, but remain a permanent part of the binder.

At first, rapeseed oil was tried with somewhat uneven results, partly because the quality of the rapeseed oil was not constant. However, the conclusion after using rapeseed oil was that surface dressing on roads with softening or thinning materials, which would be a permanent part of the binder, was definitely feasible.

Oil from fish and animal fat

At the same time as the use of rapeseed oil was being experimented with, a search for other types of oil began and the focus was set on oil from fish and animal fat. In 2008, the company Lýsi in Reykjavík began production of Omega 3 fatty acids from fish oil and produced, as a by-product, considerable amounts of ethyl ester (bio-oil), a clear, colourless liquid oil. Since this output is homogeneous and of low viscosity, it was interesting to explore whether it was better suited as an asphalt binder than rapeseed oil and white spirit.

In 2009, laboratory studies were performed on bio-oil from fish-oil. As a follow up to the positive results they yielded, it was first tested on certain stretches of roads on an experimental basis in 2010. The results exceeded expectations and in 2011 all surface dressing was executed with bio-oil or rapeseed oil. It is expected that by the year 2012, only bio oil will be used.

Eco-friendly method

Fish-oil is completely eco-friendly, since it does not evaporate and remains a permanent part of the asphalt and a slightly smaller amount than white spirit needs to be applied, i.e. 7–8 per cent. Further experiments will be performed over the next two to three years before assessments can be made on whether bio-oil meets the standards and requirements set by the Icelandic Road Administration for surface dressing.

The goal in the year 2012 is to investigate bio-diesel (methyl ester) obtained from used cooking oil from restaurants and animal fats from slaughterhouses. The company Orkey ehf. in Akureyri has already produced bio-diesel from these raw materials as a fuel for internal combustion engines. Orkey has been producing bio-diesel since the autumn of 2010.

Contact: Gunnar Helgi Guðmundsson, ghg@vegagerdin.is, ICERA, Iceland

Foto: Hejdlösa Bilder

Carbon Footprint of Freight Transport

Kari Mäkelä,
VTT, Finland

COFRET is a research and demonstration project, part-funded by the European Commission DG Research, The project will develop and test a methodology and a framework for the accurate calculation of the carbon footprint, considering all modes of transport in the supply chain.

In recent years several national government and industry-led initiatives have emerged to address the issue of measuring CO_2 emissions from freight transport. These initiatives are a valuable starting point to help support action to reduce emissions. However, problems remain in terms of comparability and accuracy of the carbon footprint calculations. Therefore the European Commission has requested an approach that would standardise the carbon footprint of transport supply chains.

Aligned to branch needs

COFRET will work with existing initiatives developed by individual stakeholders in the supply chain so that it is aligned with the needs of shippers and companies transporting goods by whatever means. COFRET will use this approach to help in the standardisation of a carbon footprinting approach for supply chains and their individual elements. The COFRET methodology will comply fully with the CEN standard EN 16258 to be published in 2012. COFRET goes beyond the EN 16258 standard, which covers only transport within a supply chain. The added value of COFRET is that it allows logistics related carbon footprint calculations in complex supply chains at product or shipment level.

A close co-operation between the research team and industry stakeholders will be an integral element of COFRET. Stakeholder consultation and a gap analysis will be carried out at an early stage so that any missing elements in the existing methods can be identified and included.

The project's main output will be supported and tested through practical application by key stakeholders in real supply chain situations. This will validate the overall methodological approach, derive recommendations for further practical exploitation and maximise the future use of the project's outcomes.

Appropriate elements of the methodology will be applied to standardised supply chain management (SCM) systems, leading to the development of a prototype software for testing purposes.

Prototype software

Whilst focusing on CO_2 emissions, COFRET will also consider other greenhouse gases such as CH_4 and N_2O, as well as so called F-gases from cooling processes.

Harmful NO_2 Emissions from Diesel Cars

Rolf Hagman,
TØI, Norway

The emissions of NO_2 in major Norwegian cities have increased, mainly due to the increasing number of diesel vehicles and an unwanted side-effect of particulate filters and oxidizing catalysts.

Exhaust emissions from vehicles are a problem in major cities in Norway. Nitrogen oxides (NO_x), together with particulate matter (PM), are the dominant harmful components. Nitrogen oxides consist of NO and NO_2. NO_2 is the most important with respect to its adverse health effects at ambient levels in urban settings.

Unlike modern petrol engines, diesel engines are not fitted with efficient systems for removing NO_x emissions. In dense urban traffic, new cars with diesel engines may emit 0.5–1.5 grams of NO_x per kilometer, which is 20–40 times more than a similarly sized petrol engine car. New heavy-duty vehicles with diesel engines emit 4–10 grams of NO_x per kilometer in dense city traffic which is 160 –400 times higher than a petrol passenger car.

NOx emissions from new vehicles with diesel engines have not been reduced as much as one might have expected from stringent EU requirements. New diesel engines meet stringent EU requirements for exhaust emissions when tested in the laboratory with today's type approval tests. However, real life emissions have been shown to be significantly higher under congested traffic conditions with driving patterns that vary more than when driving at more steady speeds. The results from type approval tests thus fail to be representative of the emissions that diesel vehicles emit in "typical" real life urban driving situations.

Photo: Harald Aas

NO_2 emissions from diesel cars are an increasing problem in Norway.

Contact: Rolf Hagman, rha@toi.no
Full report: TØI Report 1168/2011, can be found at:
www.nordicroads.com
(written in Norwegian with an English summary)

Foto: Hejdlösa Bilder

As a result, COFRET will provide a methodology that allows stakeholders and other users to review their carbon footprint in a consistent way with other elements of the supply chain. It will therefore provide for an information base to improve emissions of entire supply chains for transport and corporate organisations wanting to improve the environmental footprint of their activities.

Objectives of the COFRET project

- To establish a complete greenhouse gas emission calculation methodology and framework in the context of complex supply chains based on available calculation tools for CO_2 emissions.
- To cover all types of shipments, all types of transport relations (short and long distance), both at company level, and aggregated for transport and logistics services.
- To provide a methodology that is applicable for supply chains both within the EU and globally.
- To embed practical exploitation as a key element of the technical work programme to maximise the eventual uptake of the COFRET methodology, tools and outputs.

Contact: Kari Makela, kari.makela@vtt.fi
COFRET website: www.cofret-project.eu

Expensive Journey Ahead
If Public Transport Is to Be Doubled

A new law with regards to development relating to procured public transport took effect in Sweden at the beginning of 2012. The law applies to both bus and rail travel.

The new Swedish Public Transport Act means, among other things, that every Swedish county will have an authority responsible for public transport. This authority will produce a clearer division of roles between politics and operations, where decisions are made at the right level, in other words with strategic decisions being made in administrative form and operational decisions being made within operations.

Must be taken seriously

– Since the new law states that consultation is to take place, but nothing is mentioned as to how it should take place, it is important for the new authorities to take the consultation process seriously, says Helena Leufstadius, an expert on public transport at the consulting company Sweco.

The Swedish government hopes that commuting will become easier and that an increased amount of travellers will begin to use public transport. The government also hopes that the number of journeys on public transport will double by 2020 compared to 2006.

"Doubling for 2025"

However, Jan-Eric Nilsson, VTI, says that transport costs are rising rapidly, whereas the increase in the number of passengers is comparatively slow.

– If current trends continue, the doubling target will only be achieved in 2025. At the same time, the cost of achieving it has doubled.

Jan-Eric Nilsson has a number of suggestions on what measures can be put in place to change the situation. Among other things, he states that the authority that is responsible for public transport in the region must have better skills. It is also necessary to monitor activities to a greater extent in order to draw conclusions as to which agreements make the best contribution to developing transport services. Another part of the improvement work is to make greater use of operators' knowledge by systematically examining the new forms of contract developed.

Germany is interesting

VTI has spent two years working on identifying potential problems with obtaining effective competition in the rail sector. Bertil Hylén has presented a review of how rail transport is organised in Germany compared to how it is organised in Sweden.

– Germany is interesting because it is a major railway country close to Sweden. Germany is important for Swedish railways, says Bertil Hylén.

> *"Society would benefit from discounts given for combined journeys. The companies would also earn money by working together."*

A great deal of Swedish rail freight passes through Germany. Bertil Hylén states that rail travel between Sweden and Germany is likely to increase when the Fehmarn link is completed and Deutsche Bahn (DB) operates train services in several countries, including Sweden.

One major difference between Sweden and Germany is that DB has infrastructure and traffic (operators) in the same group. Sweden, by contrast, has maintained a strict division between the Swedish Transport Administration and the operators for a long time.

In Germany, DB is still the 99 per cent dominant operator in long-distance services operating commercially in Germany.

Nowadays there are few examples of a passenger needing to use more than one train operator for a long-distance journey.

– On the other hand there are many examples of journeys where a long-distance journey, with DB or with the Swedish train operator SJ, that is combined with a regional journey with another rail or bus operator. In that case there are completely different prices. Regional services have quite different rates and are often subsidised, states Bertil Hylén.

Bertil Hylén is impressed by Germany's ticketing system or what is known in Sweden as "the whole journey chain". With a "City-Ticket", a long-distance rail journey can easily be combined with local transport services in a hundred towns and cities. Tickets are easy to buy.

– If you arrive at an airport, Berlin Tegel for example, you can buy a train ticket on the pavement outside the terminal.

Positive view of competition

According to VTI researcher Roger Pyddoke there is a risk that it may become more expensive for travellers who need to use more than one train company to put together a combination of inter-regional journeys.

– Society would benefit from discounts given for combined journeys. The companies would also earn money by working together when they sell tickets in packages instead of separately and they could make large profits, says Roger Pyddoke.

On a Swedish website he was unable to find discounts for different combination journeys; there was only one booking system.

– Perhaps what is needed is a joint booking system, like they have in the UK. Combined tickets account for at least a quarter of all ticket revenues in the UK.

There is also a ticket booking system in Germany offered by DB. The system has been criticized by the Monopolies Commission for impeding competition, but that does not mean that efficiency is necessarily impeded.

The effects of deregulation

The Swedish market for freight transport by rail was deregulated in 1996 and the international market within the EU was deregulated in 2007. VTI researcher Inge Vierth has monitored developments since the mid-1990s.

– We take a more positive view than the Swedish Transport Agency. The Swedish

Transport Agency believes that competition is not efficient, but we believe that it has become efficient. Among other things, locomotives have become more efficient, she says.

However, profitability has been low in the rail industry, which may prevent new operators from trying to join the market. However, deregulation takes time. There are currently 15 operators on the Swedish market.

– It is necessary to analyse developments in different sub-markets. The newly established operators run exclusively combined road/rail transports and system-transportation with relatively low risk levels, and Green Cargo is the only operator that operates wagonload transport services. The situation is similar in other European countries.

Text: Ivana Vukadinovic
Photo: Hejdlösa Bilder

Contact: Jan-Eric Nilsson, jan-eric.nilsson@vti.se
Roger Pyddoke, roger.pyddoke@vti.se
Inge Vierth, inge.vierth@vti.se

Towards a Common Vehicle Classification System

Torgeir Vaa
NPRA, Norway

Foto: Knut Opeide

The Nordic countries classify vehicles and measure traffic using different methods. This makes it difficult to compare data between the countries, and has led to separate markets for traffic measurements and classification- and measurement equipment between the countries. A common approach to vehicle classification between the Nordic countries will make it easier to compare traffic data between the countries and will help create a larger single market for measuring equipment and road traffic monitoring systems.

The NorSIKT project will address these issues. It is carried out in cooperation between all Nordic countries (Sweden, Denmark, Island, Finland and Norway) and is financed by the NordFOU Research Cooperation. The main objective of the project is to standardise the system for classification of motor vehicles in the Nordic countries in order in order to:

- Determine a new joint Nordic method for converting data between different classification methods.
- Create a larger Nordic market for measuring equipment and road traffic monitoring systems.
- Reduce the cost of collecting road traffic data.

State-of-the-art report

In the first phase of the project a detailed survey of the traffic data system in the Nordic countries was carried out. The state-of-the-art report presents the current vehicle classification system in each Nordic country.

The state-of-the-art report was used as a basis for developing a preliminary vehicle classification system introducing some new principles.

Functional specification

In the second and current phase of the project, different types of registration equipment in the Nordic market are being tested according to the classification principles developed in the state-of-the-art report. The results from these tests will be used to develop a functional specification for traffic registration equipment that matches the Nordic needs.

A well-known system for classifying vehicles is the dual-loop system. This system consists of two consecutive single loops placed under the road surface only a short distance apart. A vehicle passing over the inductive detectors generates a time variable signal in the measurement circuit, a so-called magnetic signature. Signals generated by different vehicle types differ in shape, amplitude, duration etc., and can thus constitute the basis for a vehicle classification data processing algorithm. The classification system's performance largely depends on the software applied to distinguish between the various types of vehicles.

There are several other technologies that can be used for vehicle classification, and the main objective of the testing in the NorSIKT project is to investigate the capabilities of different traffic counting technologies to classify vehicles according to the classification table. Three large test sites have been constructed, including both the standard equipment in the Nordic countries and alternative technologies. The plan is to conduct full tests on three test sites in Sweden, Denmark and Norway, and comprehensive testing is already done on the Norwegian (November 2011) and Swedish (January 2012) test site.

More research needed

Preliminary results from these tests support the need for further research. An international standard procedure for testing and approval of traffic registration equipment should also be looked in to.

The weaknesses uncovered from the current systems should give grounds to discuss the next generation of vehicle classification systems. Automatic number plate readings (ANPR) can be used as a reference system, but the data loss due to unreadable number plates is too great to make this a reliable traffic counting system. The next generation solution might be to use electronic transponders containing information about vehicle class, fuel type, emission class etc. This is regarded as the "intelligent" part of the NorSIKT project and will be further elaborated in view of the final results from the testing of different technologies.

Contact: Torgeir Vaa, torgeir.vaa@vegvesen.no
More information: www.nordicroads.com

Runoff from roads and road construction may threaten the aquatic environment in nearby waters.

Foto: Knut Opeide

Nordic Road Water

Mitigating the Effects of Road Construction And Traffic on the Aquatic Environment

Sondre Meland
NPRA, Norway

The Norwegian Public Roads Administration (NPRA) has recently launched a new research and development programme addressing the detrimental impact of road construction and operations on the aquatic environment. The project NORWAT aims to generate new knowledge on emerging contaminants in traffic-related runoffs and to improve current technology and practice for mitigating the effects of road construction and road traffic on the aquatic environment.

As in many other countries, traffic volumes in Norway have increased substantially during recent decades. This together with increases in road construction activity may have a significant effect on the aquatic environment.

Discharges and runoffs during tunnel construction, for instance, might involve the discharge of particles, chemicals and oil spills, leaching of nitrogen compounds from explosives and leaching of injection chemicals. These substances can be detrimental for susceptible aquatic organisms.

Cocktail of contaminants

After a road has opened, new problems and concerns arise. Road runoffs may contain a cocktail of inorganic and organic contaminants harmful to the aquatic ecosystem. Typical contaminants are metals, polycyclic aromatic hydrocarbons and road salt. In addition, emerging contaminants in traffic-related runoffs are of concern.

Hence, much effort has been put into mitigating contamination of the receiving waters. Existing measures are largely in line with the concept of Best management practice (BMP) and Sustainable urban drainage systems (SUDS), and by far the most widely used strategy is to lead the runoff through sedimentation ponds. This removes particle-associated contaminants from the runoff before it is further discharged into the environment. Hence, dissolved and bioavailable contaminants are poorly removed and the use of sedimentation ponds may be insufficient in term of protecting the aquatic organisms.

As part of the NPRA's sectoral environmental responsibility, a new R&D programme named NORWAT (Nordic Road Water) has recently been launched.

Test of new mitigation methods

NORWAT will investigate the biological and chemical impacts of traffic-related contaminants during the construction and operation of roads. In addition, the programme aims to generate new knowledge regarding emerging contaminants and the existing SUDS. The programme will also test new mitigation strategies. An important success factor for the project will be the development of a set of criteria to clearly define when SUDS should be included or not, and if to be included, which type of SUDS should be used where using site specific criteria.

Interdisciplinary programme

NORWAT will span a period of 4 years (2012–2016) and aims to include partners from other Nordic countries. The programme will be highly interdisciplinary, with experts from the fields of engineering, hydrology, chemistry, biology and toxicology.

Contact: Sondre Meland, programme manager,
sondre.meland@vegvesen.no
Full article: www.nordicroads.com

NORDIC

ROAD AND TRANSPORT RESEARCH

A joint publication with the latest research findings of six public research organisations in Denmark, Finland, Iceland, Norway and Sweden.

FINLAND

TECHNICAL RESEARCH CENTRE
OF FINLAND (VTT)

VTT Technical Research Centre of Finland is a contract research organisation with a staff of 2,800. In this joint publication, the VTT expertise areas cover research and development of transportation, logistics and road structures. The work is carried out in five research groups employing a staff of 60.

DENMARK

DANISH ROAD DIRECTORATE (DRD)
DANISH ROAD INSTITUTE (DRI)

The Road Directorate, which is a part of The Ministry of Transport, Denmark, is responsible for development and management of the national highways and for servicing and facilitating traffic on the network. As part of this responsibility, the Directorate conducts R&D, the aim of which is to contribute to efficient road management and to the safe use of the network. The materials research component is carried out by the Danish Road Institute.

SWEDEN

SWEDISH NATIONAL ROAD AND
TRANSPORT RESEARCH INSTITUTE (VTI)

VTI is an independent and internationally prominent research institute in the transport sector. Its principal task is to conduct research and development relating to infrastructure, traffic and transport and its operations include all modes of transport. VTI has a total of some 200 employees. VTI's head office is in Linköping, with branch offices in Stockholm, Gothenburg and Borlänge.

ICELAND

ICELANDIC ROAD ADMINISTRATION (ICERA)

The ICERA's mission is to provide the Icelandic society with a road system in accordance with its needs and to provide a service with the aim of smooth and safe traffic. The number of employees is about 290. Applied research and development and to some extent also basic research concerning road construction, maintenance, traffic and safety is performed or directed by the ICERA. Development division is responsible for road research in Iceland.

NORWAY

NORWEGIAN PUBLIC ROADS
ADMINISTRATION (NPRA)

The Norwegian Public Roads Administration is one of the administrative agencies under the Ministry of Transport and Communications in Norway. NPRA is responsible for the development and management of public roads and road traffic, as well as the Vehicle Department. This responsibility includes research and development of all areas related to road transport and the implementation of R&D results.

INSTITUTE OF
TRANSPORT ECONOMICS (TØI)

The Institute of Transport Economics is the national institution for transport research and development in Norway. The main objectives of the Institute are to carry out applied research and promote the application and use of results through consultative assistance to public authorities, the transport industry and others. TØI is an independent research foundation employing about one hundred persons.

Contact

SWEDEN
Katarina Ljungdahl
SE-581 95 Linköping
Phone: +46 13 20 42 26
Orderphone: +46 13 20 42 69
E-mail: nordic@vti.se
Web: www.vti.se

DENMARK
Helen Hasz-Singh
Guldalderen 12
DK-2640 Hedehusene
Phone: +45 72 44 70 00
E-mail: hhz@vd.dk
Web: www.road-directorate.dk

FINLAND
Kari Mäkelä
P.O.Box 1000
FI-02044 VTT
Phone: +358 20 722 4586
E-mail: kari.makela@vtt.fi
Web: www.vtt.fi

ICELAND
G. Pétur Matthiasson
Borgartún 7
IS-105 Reykjavik
Phone: +354 522 1000
E-mail: gpm@vegagerdin.is
Web: www.vegagerdin.is

NORWAY
Johanne Solheim (NPRA)
P.O. Box 8142 Dep
NO-0033 Oslo
Phone +47 915 02030
E-mail: johanne.solheim@vegvesen.no
Web: www.vegvesen.no

Harald Aas (TØI)
Gaustadalléen 21
NO-0349 Oslo
Phone: +47 22 57 38 00
E-mail ha@toi.no
Web: www.toi.no