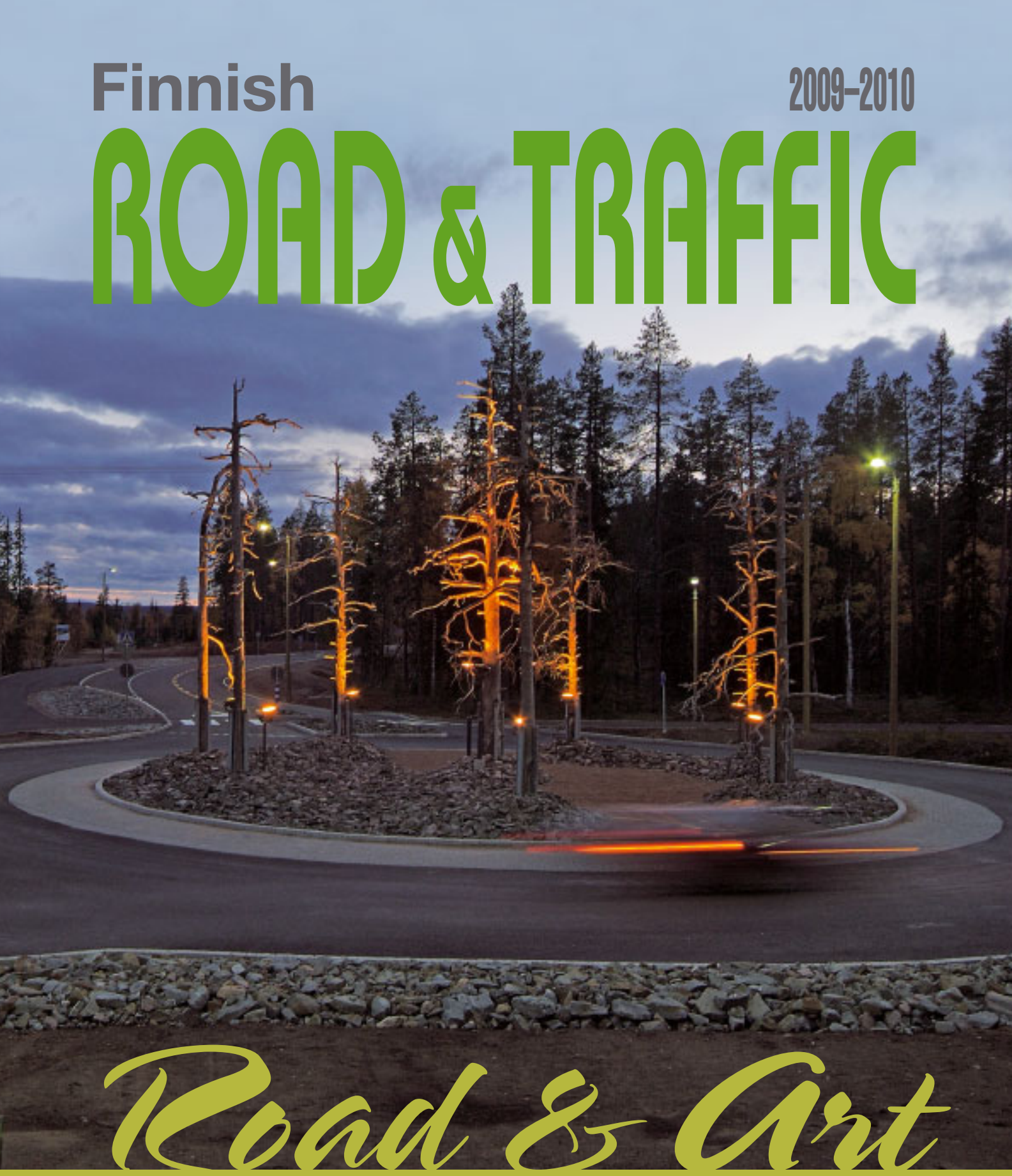
Finnish

2009–2010

ROAD & TRAFFIC



Road & Art

- The Northern Axis
- Road dust problem
- New de-icing agent
- Climate change & road maintenance
- Winter Road Congress in Finland

Sharing the road

16th World Road Meeting

Contents

Finnish ROAD & TRAFFIC 1960-2010

Publisher
Finnish Road Association
Member of the International Road Federation (IRF)

Editor-in-Chief
Jaakko Rahja
jaakko.rahja@tieyhdistys.fi

Editor
Liisi Vähätalo
liisi.vahatalo@tieyhdistys.fi

Address
P. O. BOX 55, FI-00441 Helsinki, Finland
www.tieyhdistys.fi

Tel
+358 207 861 000

Fax
+358 207 861 009

Layout and printing
Forssan Kirjapaino Oy

Cover photo
Sauli Koski: Ylläs roundabout

Editorial

Traffic into tunnels

Especially in the Central European and in some other mountainous countries, like Norway and Japan, tunnels have been built frequently both on roads and railways. Reason for this is naturally geographical restrictions and obstacles. Difficult mountains had to be either lead under or through.

It is positive and justified that construction of traffic tunnels has increased.

Not so many years ago tunnel construction was rather rare in Finland. Now we have at disposal for example road and railway tunnels to Vuosaari Port which was completed in 2008 and was all time largest infrastructure project in Finland. The new port is located near Helsinki and it serves the whole country.

There are new traffic tunnels also on Helsinki-Turku motorway. Its latest section was opened at the beginning of year 2009. Motorway Helsinki-Turku is part of E18 road and also very important route from Finland to Russia. There are as many as seven twin tunnels on the road, longest almost three kilometers.

Popularity of traffic tunnels in Finland has not increased so much due to difficult and challenging terrain but due to willingness to preserve environment and increase fluency of traffic. Fluent traffic itself saves environment. It is very recommendable that through traffic - especially heavy traffic - is directed to own routes under the ground.

Tunnel solutions are not very cheap. Construction itself is costly but especially latest safety and technological requirements have increased costs. But in the long term positive factors are more important than high costs.

Newest road tunnels are a good example of high technology. Casual driver may not notice anything but technology "wakes up" as soon as need arises. Cameras on the ceiling monitor discreetly if traffic runs normally. But as soon as a vehicle has to stop, nearest camera focuses on the vehicle showing to the traffic centers staff, what is the situation. Simultaneously, over-lane signs turn either to yellow oblique arrow or to red tick, depending on the situation. Driving is not allowed until green light turns up. Also illuminated speed limit signs show, what is suitable speed.

Emergency phones, parking bays and gateways are normal tunnel equipment. In case of fire or accident loudspeakers begin to give behavior rules. Simultaneously also sign boards instruct what to do and show route to safer areas.

Traffic tunnels are part of modern infrastructure today but definitely their number will increase in the future. They are environmental-friendly and increase traffic comfort.

BRIEFLY

In a long term traffic tunnels are a profitable way to preserve environment.

Transport connections between the EU and Russia and the position of Finland

Lic.Tech. Kari Lautso
WSP Finland Ltd.

The Northern Axis is one of the five Trans-European transport Axes defined by the "High Level Group" in 2005 and presented in the report "Network for Peace and Development". The Axis is the main trade and transport connection between Russia and the EU countries. The Axis consists of main rail and road corridors starting with the Berlin–Moscow corridor in the south and ending with St. Petersburg–Narvik corridor in the north.

A pilot study on the transport of the Northern axis[1] was commissioned by DGTREN with the aim to later continue with other studies on the other Axes. WSP Finland was selected to do the study[2]. In order to fulfil the goals of the study the project has:

- *Collected data on infrastructure, traffic, transport regulations, operations etc.*
- *Analysed the current condition of the infrastructure*
- *Analysed investments and financial commitments*
- *Built long term exogenous scenarios describing the future trade demand*
- *Modelled the current and future transport demand*
- *Analysed current and future physical and non-physical bottlenecks*
- *Defined priority projects*
- *Made plans and recommendations for the organisation, management and tasks for establishing the Northern Axis cooperation*
- *Developed and piloted standard methods that could be used in other Axes for collecting and analysing data, assessing bottlenecks and defining priority projects in order to produce comparable results for other axes*

Part of the collected data is stored in the Commission's TEN-T database.

The analyses show that the transport demand will roughly double by 2020 between the EU and Russia in all studied scenarios creating increasing pressure for the infrastructure development. However, even after implementation of the current extensive infrastructure plans, bottlenecks will remain on the transport networks.

Clearly the most severe problems are concentrated on border operations resulting to long waiting times. This is due to differences in administrative and technical systems of neighbouring countries. Thus, there is a common interest and challenge for both non-EU and EU countries along the Northern Axis to improve their transport connections.

The study gave also a clear picture of Finland's position in the trade between the EU and Russia and the role of the transport routes through Finland. The studies show that this route will maintain its importance also in the future and it will be based, among others, on good level of service, safety, port capacity and supporting services.

[1] K. Lautso et al., 2007: The Northern Transport Axis – Pilot for the analytical support framework to monitor the implementation of the infrastructure and "soft" measure proposed by the High Level Group, Directorate-General Energy and Transport, Helsinki, 167s.

[2] The subcontractors were: Transys Oy, Matrex Oy, Kari Hietala Oy, Anseri Oy, TRT Trasporti e Territorio srl and WSP UK

The Northern Axis consists of the following road and rail corridors that are directly linked to the TEN-T networks:

1. Narvik–Haparanda/ Tornio–St. Petersburg
2. Helsinki–St. Petersburg–Moscow
3. Tallinn–St. Petersburg
4. Ventspils–Riga–Moscow
5. Klaipeda–Vilnius–Minsk
6. Kaliningrad–Vilnius
7. Berlin–Warsaw–Minsk–Moscow
8. Oslo–Swedish Border (direction Gothenburg)
9. Oslo–Swedish Border (direction Stockholm)

Accordingly, the geographical scope of the project has covered the following EU countries: Sweden, Finland, Estonia, Latvia, Lithuania, Poland and Germany and the following non-EU countries: Norway, Russia, Belarus.

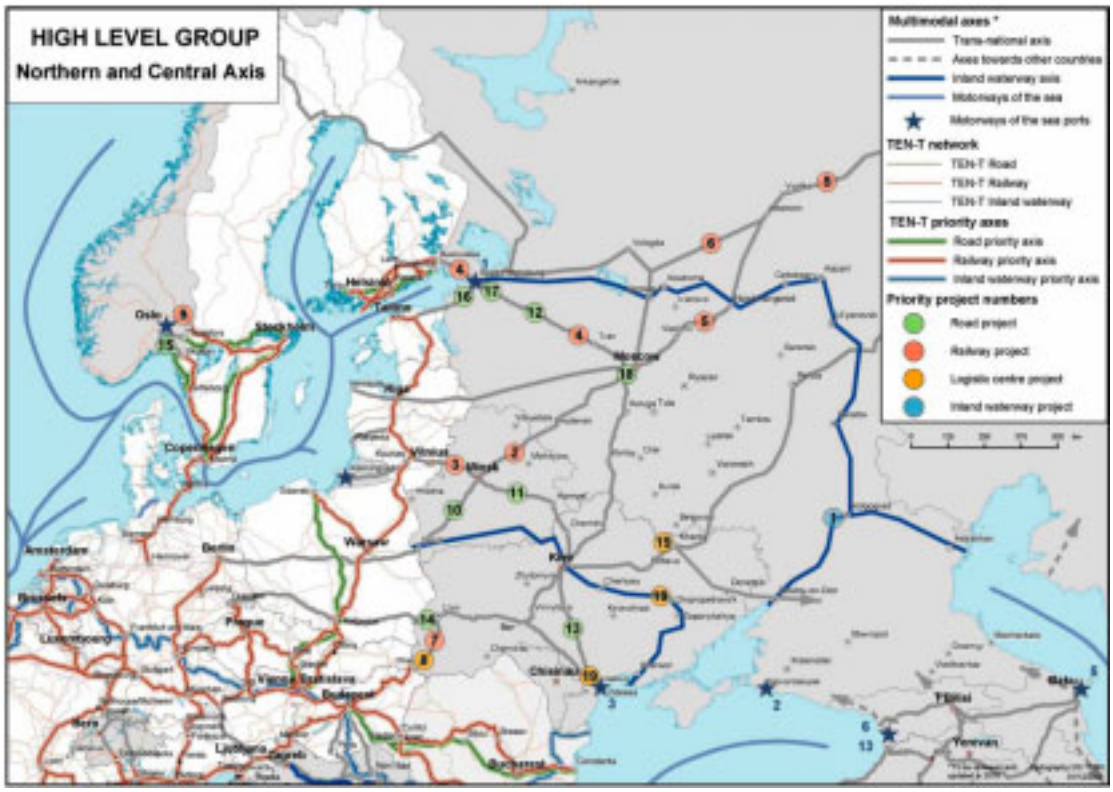
The data collection included all necessary information needed for identifying bottlenecks and investment needs including also data in the same format that is used for the TEN-T networks.

The transport network comprises 7 000 km roads and 7 300 km railways. The majority (55 %) of the net- →

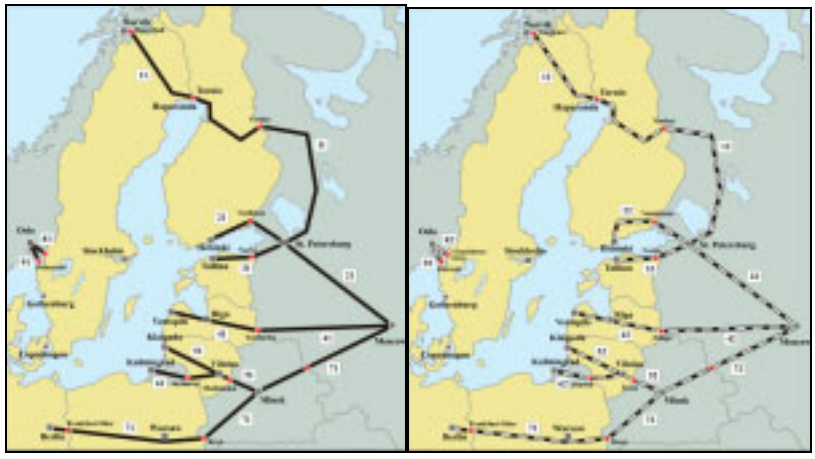
work length is outside the EU, 40 % in Russia alone. Railway problems include different gauges, electricity and signalling systems. Road network problems are smaller, for example the maximum weight in Russia is 38 tons and 44 tons in the EU.

Investments

The Northern Axis roads and railways belong to the trunk system of each country. They are important both for domestic and international traffic. Therefore, the countries invest heavily in this portion of their transport infrastructure. The total planned investments by 2020 are 22 billion euros. The share of roads is 65 % and the share of railways 35 %. The investment plans by country and branch is presented below. The clearly most important branches are Helsinki–Moscow (42 %) and Berlin–Moscow (34 %).



Transport corridors passing the Northern Axis area



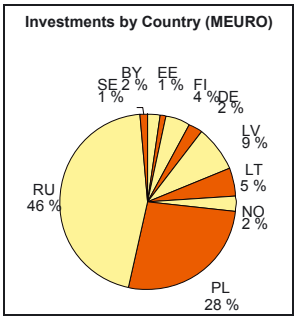
The studied road and rail networks

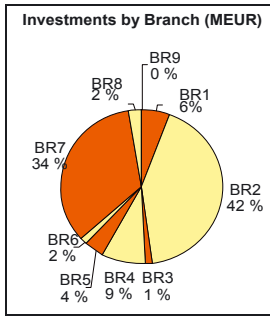
Transport forecasts

Transport demand can be explained by economic factors. Exogenous scenarios were made to describe the political and economic development.

Economic growth has been divided into two components: productivity growth and growth of labour input measured by employed people or population. Growth rate is estimated at a little bit over three percent per year in the world level. Two thirds of this is explained by productivity growth and one third by population growth. Population growth will decrease in the future and the growth in GDP, accordingly.

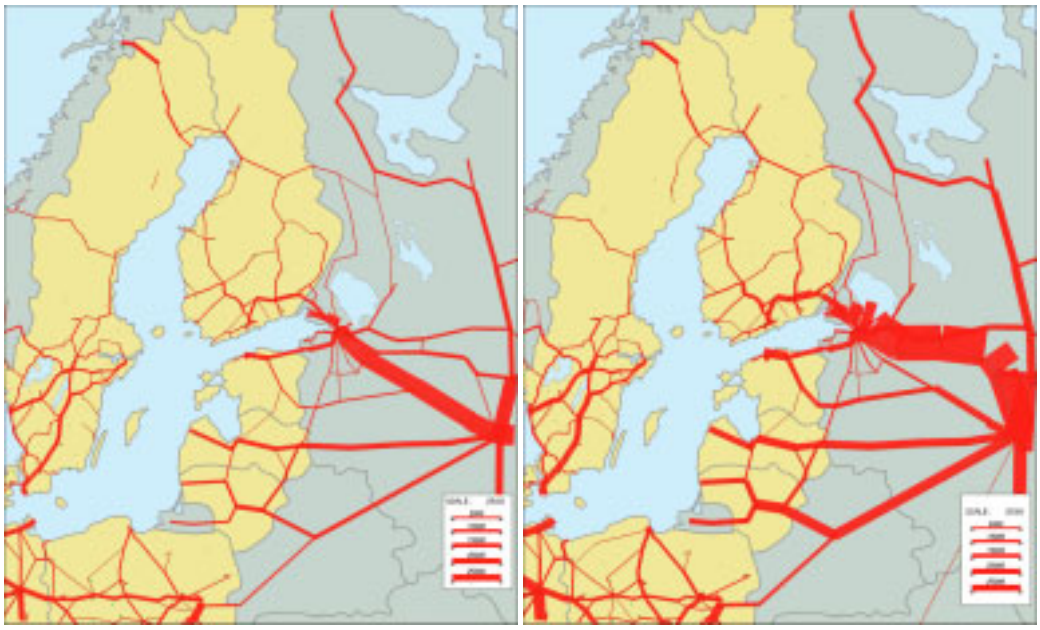
Export forecasts were derived from GDP forecasts by taking into account the change in export rates (exports as a percentage of GDP). Generally export



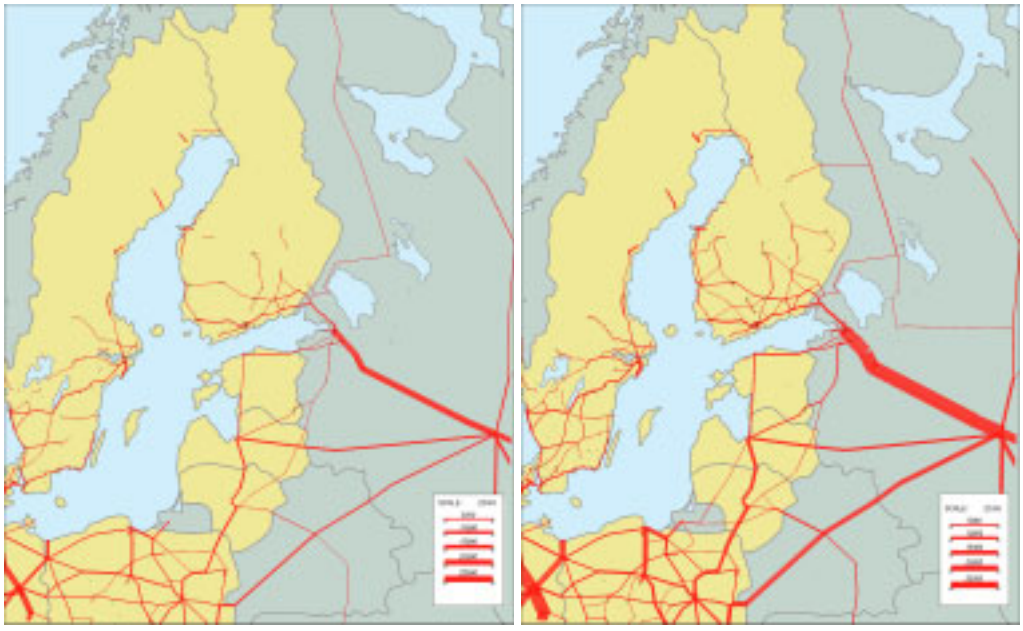


BRANCH	Total	Share
Br 1 Narvik-St. Petersburg	1259,2	5,8 %
Br 2 Helsinki-Moscow	9165,3	42,1 %
Br 3 Tallinn-St. Petersburg	300,3	1,4 %
Br 4 Ventspils/Riga-Moscow	1853,7	8,5 %
Br 5 Klaipeda/Vilnius-Moscow	853,0	3,9 %
Br 6 Kaliningrad-Kaunas	377,5	1,7 %
Br 7 Berlin-Warsaw-Moscow	7442,0	34,2 %
Br 8 Olso-Stockholm	530,0	2,4 %
Br 9 Oslo-Copenhagen	0,0	0,0 %
TOTAL	21781,0	100,0 %

Investments by country and by branch in the Northern Axis 2007–2020



Assigned international transport volumes on rail network in 2000 and 2020 (1000 tons/year, <0.5 million tons/year not shown)



Assigned international transport volumes on road network in 2000 and 2020 (1000 tons/year, <0.5 million tons/year not shown)

rates are increasing because of technology change and globalisation. Correspondingly, exports grow more than GDP in most cases. Exports grow 1.5 fold in the old EU-countries and 2.4 fold in the new EU-countries by 2030. At the same time GDP grows 2.1 fold in new EU-countries and 1.3 fold in the old EU-countries. Country specific export/import forecasts were also made.

Next, the growth rates for different commodity groups have been estimated. These serve as the basis for transport flow forecasts based on the assignment of the transport demand on the network.

The freight transport volumes will rapidly increase within EU and between EU, Russia and other continents. The growth is estimated at 82 % from 2000 to 2020. In ton-kilometres the growth is even higher, 94 %. The system wide transportation costs will increase by 108 % between 2000 and 2020. This growth will be a big challenge also to the present infrastructure and its capacity. Increasing Russian freight will affect every available border station in the Northern Axis countries also in the future.

An economic recession in Russia would not necessarily decrease the freight flows in the Northern Axis area: Russia would consume less and export more oil and raw materials to support its economy. The transport problems might be even more challenging in this case to solve.

Rail transport's share of mileage is 1/3. It produces only 10 % of emissions. Sea transport, which produces most emissions, has slightly bigger share of emissions than of mileage, ca 50 %. Road transport's share is ca 17 % of mileage but 35 % of emissions. Even if freight grows rapidly the relative shares by mode remain about the same during the forecast period.

Does the transport network meet the future requirements?

Transport forecasts were used to analyse the future bottlenecks assuming that the planned investments are made.

The most severe problem of the road network is the poor operation of the border stations. Border stations cause 98 % of delays. The planned investments mitigate capacity problems but are not enough to remove them. Capacity problems remain especially in and around big cities.

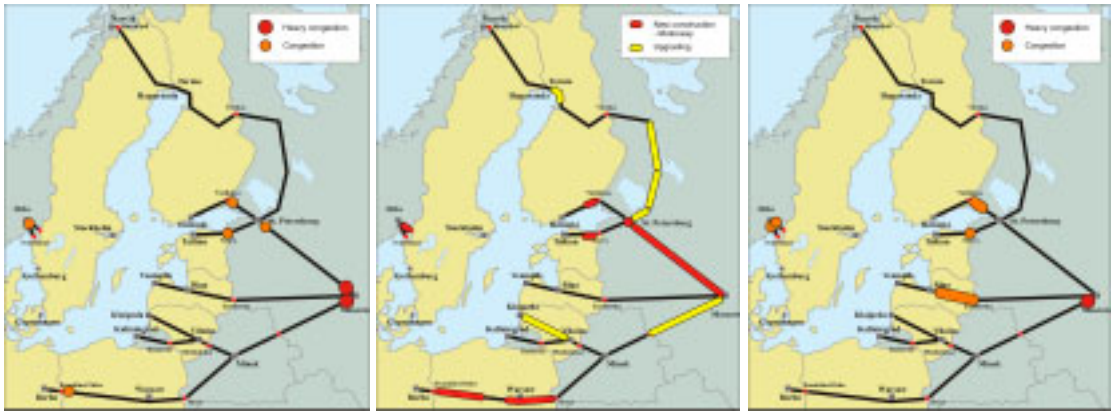
Also the railway network becomes congested and new investments are made to remove problems. The investments are, however, not enough to remove all capacity problems due to growing traffic.

The following figures illustrate the current bottleneck situation, the planned investments and the future bottleneck situation.

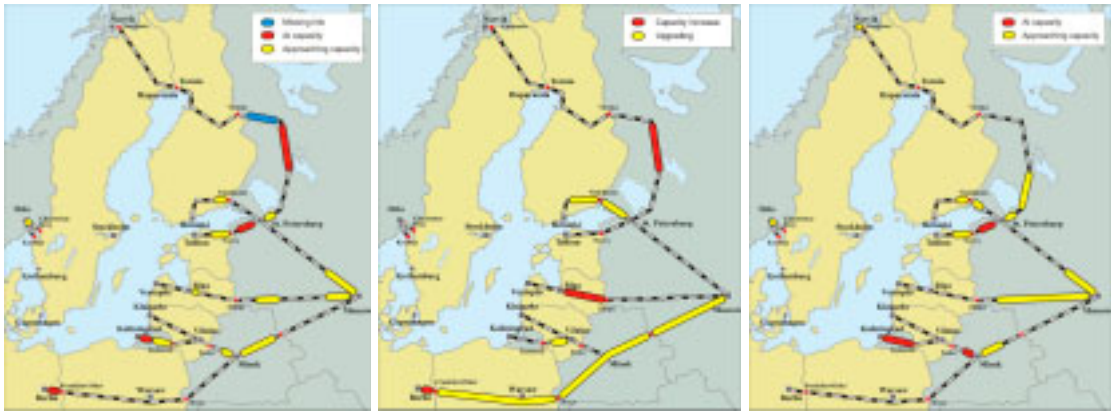
The position of the Moscow–St. Petersburg –Helsinki branch

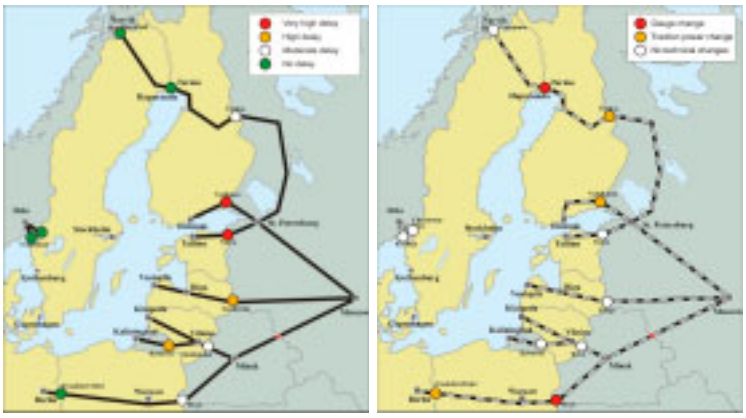
The following figures illustrate the growth of trade between the EU and Russia in both tons and in monetary value, as well as the position of the route through Finland compared with other routes.

ROADS: Current bottlenecks, programmed projects and bottlenecks in 2020 after implementation of the programmed projects

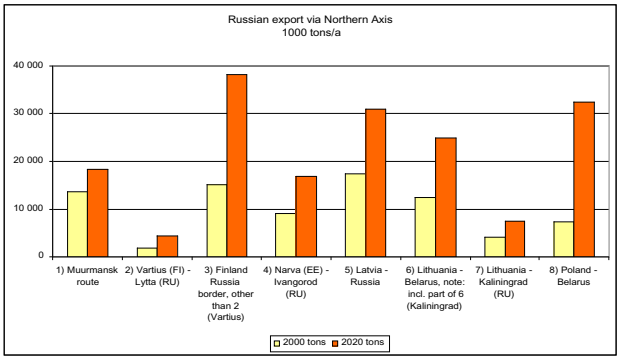


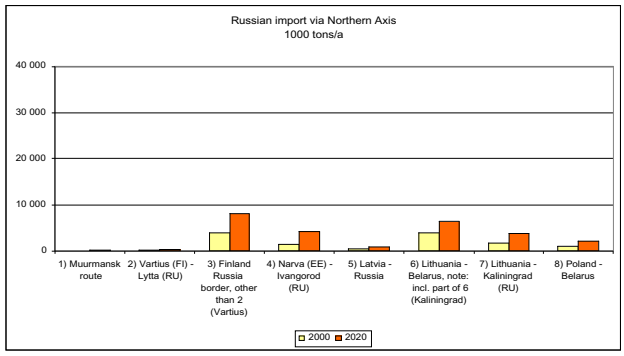
RAILWAYS: Current bottlenecks, programmed projects and bottlenecks in 2020 after implementation of the programmed projects



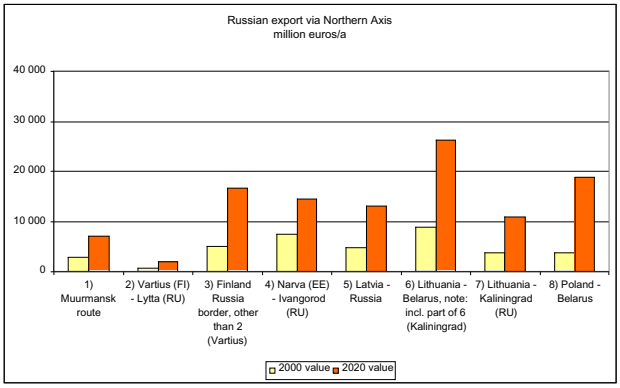


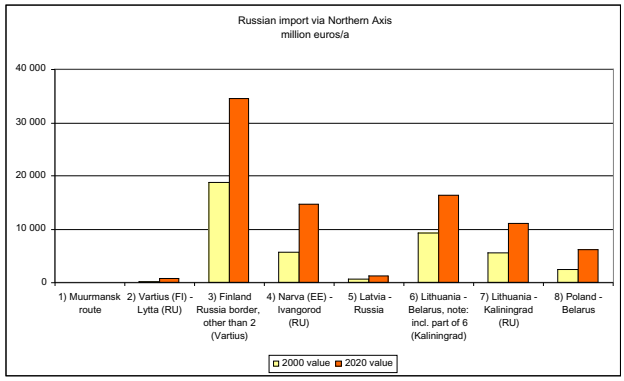
Situation of Road and Rail border stations





Russian export and import via the Northern Axis area (1000 tons/year) in 2000 and 2020





Russian export and import via Northern Axis area (million euros/a) in 2000 and 2020

The goods transport will almost double on the border between Finland and Russia by the year 2020. The route through Finland will maintain its role and has an especially important role regarding transport of valuable goods from EU to Russia.

The most important problem is the operation of border stations and almost any investment to improve the operation would be profitable.

The outlook for the development of the Moscow–St. Petersburg–Helsinki branch is good as it represents about 42 % of all planned investments in the Northern Axis. ■

Lic. Tech., M.Sc.Kari Lautso is a transport research and planning specialist with extensive experience of transport related research, studies and planning on international, national and local levels. He has been in charge as project leader or task leader for about 15 EU funded projects for DG TREN and DG Research. At WSP Finland he now works as project manager and senior consultant in multidisciplinary projects. In addition to WSP Finland Mr. Lautso has also been employed by Helsinki University of Technology as laboratory engineer, leader of postgraduate courses and associate professor (traffic and transport planning).

Art – highlight of road environment

Eira Järviluoma, Environmental Affairs Coordinator
Finnish Road Administration, Lapland Region

The Lapland Region of the Finnish Road Administration has implemented dozens of works of art in the road environment since the 1990s in cooperation with municipalities, companies and local people. Works of art can be found in roundabouts, on walls of underpasses, at rest areas and on slopes. Works of art are a part of traffic environment and highlight the uniqueness of the site.

Especially northern artists and architects have been the designers of the artworks. Residents and schoolchildren have also been invited to generate ideas and to realize the works. Starting point of a work might have been northern nature as well as local tale tradition.

In 2004 the Road Region of Lapland got the Pro Arte Lapponiae medal from the work for the environmental art. When receiving the medal the regional director **Tapani Pöyry** emphasized that also the role of municipalities has been crucial in generating ideas, choosing the artists and in financing.

In 2008 the work of the Lapland Road Region was noticed again when the roundabout of the Ylläs landscape road won the national Roundabout of the Year competition.

The road environment art of Lapland has been also an object of a thesis in the Art faculty of the University of Lapland. In 2003 **Saul Tyni** finished his thesis "Cover of Land in its place". Tyni stated that the land art work "Cover of Land" represents nature protecting local values which bind the work to the local environment.

Pallas-Ylläs national park: "Cover of Land"

By the road 957, which leads to the village of Raattama, there is a land art work called "Cover of Land" by artist **Kaija Kiuru**. The total area of the work is 32.000 m^2 and it is the largest work of art ever implemented in the Road Region of Lapland. The starting point of this work was the surrounding national park and soft forms of landscape. The land art work repeats the forms of fells and lakes. Kaija Kiuru says that she found the figures that fit to the terrain from fell, from the lake of Pallas and by measuring the slopes and walking back and forth the road.

The artist was allowed to use only natural material from national park. The fig-

"Rainbow" in the Salla roundabout. Photo Bart Braafhart.

ures are formed from stones, trees, bushes, meadow flowers and ground plants. From the use of natural material follows that the work changes as time passes.

One basis for the work was to repair the ugly scars in the scenery of the national park which the road construction with its slope cuttings caused when the road was built at the beginning of the 1980s. The repair work succeeded very well by the means of land art.

Levi roundabout: "Rift"

One of the most interesting environmental works of art is located in Levi, in the village of Sirkka. The work "Rift" is designed by Hungarian architect student **Balázs Turain**. The materials of the work are glass and wood. In a glass cube there is a pile of firewood which is illuminated by the lights built inside the cube.

According the artist this work represents contrasts between natural and artificial material. The pile of firewood is heavy and the glass cube is transparent, almost immaterial. The work illustrates also the tradition and the new, local identity and globalization. According the artist the Finnish have found a balance in how to maintain locality, especially the cultural and spiritual values as well as the identity without sacrificing them to the benefits of the globalization.

"Icicles" in Tornio. Outokumpu Stainless Oy participated in the implementation of this work made of steel. Photo Eija Haapalainen.

Detail of the work of art "Rift" in Levi. Photo Sauli Koski.

The winner roundabout in Ylläs. Photo Sauli Koski.

Roadside art in East Lapland

By the highway 5 and road 962 tourist finds in the rest area of Torvinen the massive wooden cranes designed and realized by **Erkki Alajärvi**, and in the rest area of Vuostimo the works illustrating log floating which **U.K. Kärri** from Kemijärvi has constructed from old floating booms.

The newest artwork, "Rainbow" by architect **Eva Persson Puurula**, can be found in the village of Salla in the junction of the roads 82 and 950. "Rainbow" is made of eight logs referring to the colors of rainbow. This work was the winner of the design competition and was selected among 83 ideas from 72 designers.

Professor **Timo Jokela's** work in Pyhätunturi in the roundabout of Kultakero will be accomplished in summer 2009. This work is a positional environmental work which is based on the history of the region, traditional sources of livelihood, reminiscence tradition and tourism. The work is implemented together with the Road Region of Lapland, local tourist entrepreneurs, the municipality of Pelkosenniemi and the Art faculty of the University of Lapland.

The light work in Muonio rock cut. Photo Jaakko Alatalo.

Light in works of art

When arriving from north to Muonio, on the road 21 there is a light work of art in a cutting and one purpose of it is to wake up drivers to slow down when arriving to the center. The work is designed by **Juhani Parviainen** and it consists of nine bowed pillars which illuminate the rock.

In Tornio-Röyttä roundabout where the motorway to Kemi starts there is the work of art called "Icicles" designed by architect **Jussi Tervaoja**. 16 steel pillars are illuminated from inside by blue light which illustrates arctic nature.

The forms of terrain, forest and details, as well as big trees and stones, are illuminated by the road be-

"Cover of Land" in Pallas right after the completion in 2001. Photo Eija Haapalainen.

tween Pyhätunturi and Luosto as well as by the landscape road of Ylläs. In Pyhätunturi the shade of light is white which makes the colors natural and pure. In Ylläs the lights change according to the seasons. In summer the colors are warm and in winter they are cold.

The motifs of the reliefs of artist Erkki Alajärvi in the underpasses in Sodankylä and in Tornio have been funny local stories. There are reindeers, dogs and villagers returning from shopping in the center with their loads. In Tornio the motifs have been sources of livelihood, farming, industry, shipping as well as marrying across the border.

Illuminated forms of terrain by the Ylläs landscape road. Photo Sauli Koski.

Schoolchildren and students as makers

The schoolchildren and students from Rovaniemi and Tornio regions have participated in painting and realizing the figures they have designed to pedestrian underpasses.

Designing continues

Work with environmental art continues. Now is being planned environmental works of art to new roundabouts in cooperation with the cities of Tornio and Kemijärvi. In the motorway project in Kemi there is under consideration how to highlight the gate of the city for example by lighting. ■

Impact of climate change on road maintenance

M.Sc. (Tech.) Olli Mäkelä, Destia Oy
M.Sc. Vesa Männistö, Finnish Road Administration
D.Phil. Ari Venäläinen, Finnish Meteorological Institute

Climate change has major effects on road management. The general practices and procedures currently in use in southern Finland are gradually shifting further north. In many cases maintenance will become more expensive. Regionally, the changes may have opposite effects.

The trend of development of mankind's emissions and the resulting concentrations of greenhouse gases are decisive factors when estimating future changes in the climate. They are affected by the world's population growth, the development of the world's economy, and available methods of producing energy.

As different directions of development are possible, several scenarios of the effects of climate change have been created. In order to estimate Finland's future climate as reliably as possible, the results of several climate models are needed.

Climate change in Finland

It has been estimated that the average temperature of Finland's climate will rise more than 2 °C and precipitation will increase 5–10 % by 2040. Both the rise in temperature and the increase in precipitation will be greater in winter than in summer. The period of thermal winter and snow cover will shorten and the number of hot summer days will increase. The depth of frost penetration will decrease significantly by the end of the century.

Changes in Finland will be greater than average changes elsewhere on the earth. Changes will vary in different parts of the country. According to estimates, by 2100 the first freezing temperatures will arrive 20–30 days later and the last freezing temperatures in the spring will occur 20–30 days earlier. The total number of days with sub-zero temperature will decrease by 50–60 days north of the Kemi-Kajaani line, by 60–70 days south of the line, and by more than 70 days along the coast of the northern part of the Gulf of Bothnia. The number of cold days will decrease most in the autumn and spring, but fewer cold days also in mid-winter will lead to a more fragmented period of freezing temperature.

Funding for pavement repair and patching has been increased in recent years, but the need is expected to continue growing strongly.

Although winter precipitation is expected to increase in terms of the number of days of precipitation and maximum daily precipitation, the rise in temperature will result in less snowfall and snow cover, particularly in southern and western Finland. The snow cover will appear later and melt earlier.

Due to higher maximum winter precipitation, snowstorms that greatly hinder traffic may become heavier. It is possible that the heavy snowstorms common along the southern coast, which result from the combined effects of the warm sea and cold air, will also begin to appear along the shores of Finland's large lakes, as they freeze over more slowly and remain ice-free longer.

In Finland's current climate, freezing rains, which are difficult from the standpoint of winter maintenance, occur about eight times a year, on average. For the most part, freezing rains are expected to decrease, but they will increase slightly in the northern parts of Finland as near-freezing temperatures become more common there.

As winters become milder, frost penetration will decrease, although on the other hand a thinner snow cover will not retard frost penetration as much as before. The thickness of the layer of frost under roadways is expected to decrease in southern and central Finland from the current 100–150 cm to 50–100 cm by the end of the century. In northern Finland the corresponding change will be from the current 200–300 cm to 100–200 cm, depending on the composition of the soil.

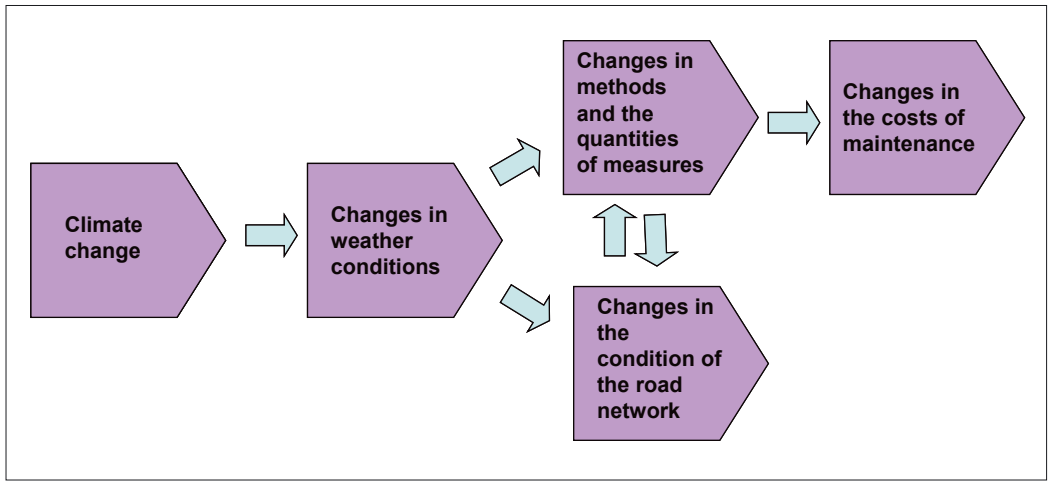


Figure 1. Impact mechanisms and costs of climate change on road care and upkeep.

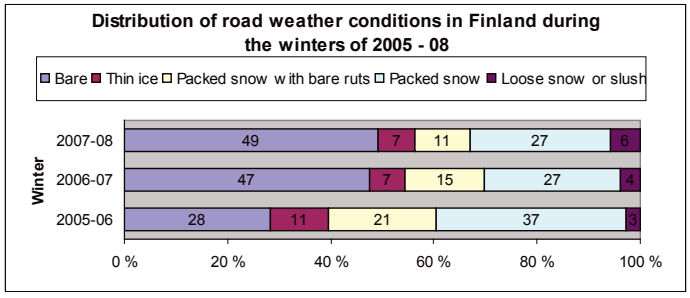


Figure 2. Distribution of winter road weather conditions during the winter seasons of 2005–2008 according to quality monitoring of winter maintenance.

How does climate change reflect on road management?

In road management, weather conditions directly affect some maintenance measures. For example, a snowfall triggers plowing, so the number of snowfalls reflects directly on the quantity and costs of plowing.

On the other hand, some measures, like removal of packed snow by means of salting or grading, are triggered on the basis of the condition of the road surface. The condition of the road surface, such as the amount of packed snow, is affected by weather conditions on one hand and by preceding maintenance measures on the other hand, so the impact mechanisms are more complex (figure 1).

Weather conditions are reflected on upkeep in that they cause changes in the condition of the road network and thereby in the need for maintenance measures. For example, as wet and bare road surfaces become more common, wear caused by studded tires will accelerate, increasing the need for pavement repair. The impact mechanisms affecting the need to repair frost heave damage are more complex, being related to the amount of precipitation, the time when the ground freezes, the winter's frost sum, which affects the depth of frost penetration, and weather conditions at →

Main characteristics of climate change in Finland:

- change in Finland will be greater than average changes elsewhere on the earth
- the amount of greenhouse gases will significantly affect the rate of change
- winter temperatures, in particular, will rise and wintertime precipitation will increase
- very low temperatures will become rare
- summertime heat waves will become more common
- the period of snow cover will get shorter
- there will be less frost than there is today

the time when frost is thawing.

Winter maintenance

As winters become milder, the proportion of bare roads will increase. During the mild winter seasons of 2006–08, over half of the road network was bare or bare-looking, yet slippery, while in the winter season of 2005–06 the corresponding proportion was only 39 %. Correspondingly, the proportion of roads partly or completely covered by packed snow decreased from about 60 % to about 40 % (figure 2).

There are major differences in the distribution of road surface weather conditions, both by region and by winter maintenance class. In the winters of 2006–08, 70–80 % of the main roads in the Uusimaa and Turku districts were bare. The proportion of bare roads in the Lapland district was 15–25 %; most of the roads were covered with packed snow. Winter maintenance class Is and I roads are mainly bare in most of the country. Significant from the standpoint of winter maintenance policy is the increase in the amount of bare road surfaces in winter maintenance class Ib; the proportion increased from 32 % in the winter of 2006–07 to 50–55 % in the winters of 2006–08. Maintenance of roads covered with packed snow becomes more difficult and pressure to salt the roads to thaw them increases.

More salting was needed than before during the mild winters of 2006–08, especially inland and along the northern coastline, but the amount remained unchanged along the southern and western coasts.

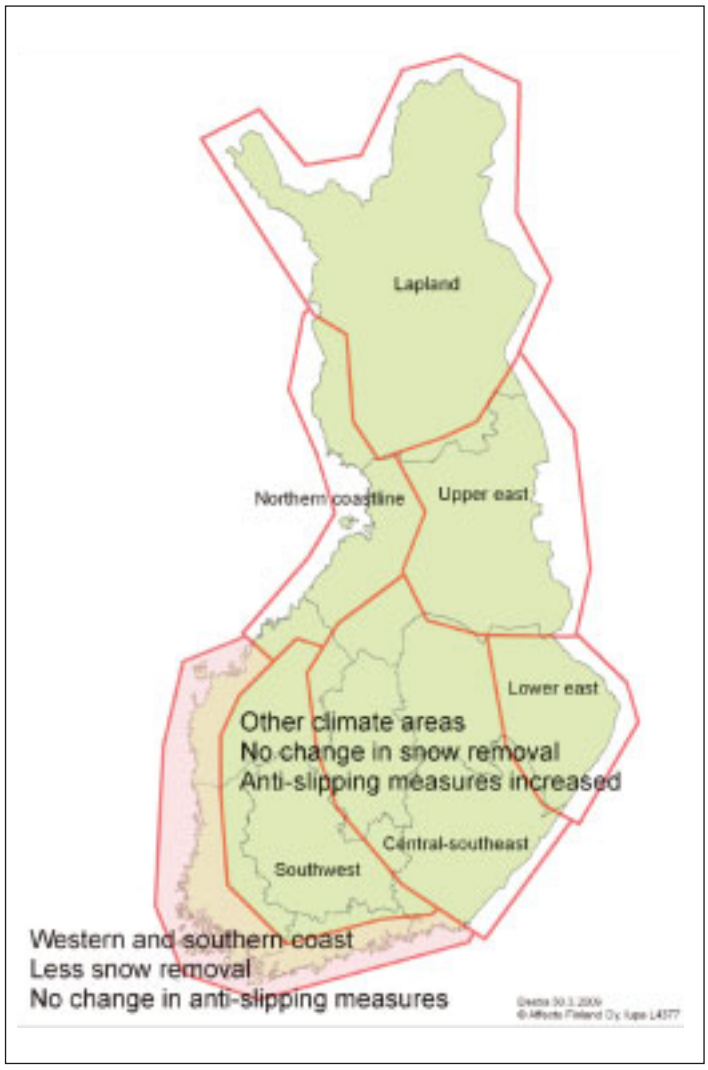


Figure 3. Summary of the amount of winter maintenance measures by climate area during the winters of 2006–08 compared with the previous winters of 2003–06. Source: Finnra's AURA system data.

Ninety percent of winter maintenance costs are accrued from snow removal and anti-slipping measures. The amount of plowing along the southern and western coasts in the winters of 2006–08 decreased compared with previous years, but no significant changes were observed elsewhere. More salting was needed than before during the mild winters of 2006–08, especially inland and along the northern coastline, but the amount remained unchanged along the southern and western coasts. More sanding was needed during the winters of 2006–08, especially in northern and eastern Finland (figure 3).

As far as winter maintenance is concerned, the conditions and practices of southern Finland are shifting northward. The threshold for salting main roads is advancing northward 10–15 km a year. Because of periods of warm winter weather, maintenance of roads covered with packed snow is becoming difficult further and further north. Winter maintenance of bare gravel roads is particularly difficult along the southwestern coastline. Winter maintenance experts generally agree that plowing can be handled, but anti-slipping measures will become more difficult.

Table. Road management costs by product and estimated impact of climate change on costs. Source of costs: Finnra's operating and financial plan 2009-2013, November 2008.

	Costs in 2009		Impact of climate change	
	Mil. €/yr	%	Trend[1]	Reasons
Road network maintenance	**230.1**	**44 %**		
- winter maintenance	101.6	19 %	+	Snow removal will remain unchanged, but anti-slipping measures will be more difficult and costly.
- maintenance of traffic surroundings	64.6	12 %	0	
- gravel road maintenance	28.7	5 %	++	The gravel road maintenance period will lengthen, particularly in the autumn. Conditioning of gravel roads for winter will become more difficult. The need for frost heave maintenance will increase.
- ferry transports and ice roads	35.2	7 %	–	Ferry transports will become easier due to thinner ice. A lack of ice roads will increase ferry transports.
Road network upkeep and renewal investments	**235.4**	**45 %**		
- pavement renewal	68.3	13 %	++	Pavement will more often be wet, bare and susceptible to wear.
- pavement patching	65.5	12 %	++	More freeze-thaw cycles will deteriorate pavement.
- road markings	15.3	3 %	0	Markings will wear away more quickly on bare, wet pavement. Less snow removal will lessen wearing of markings.
- bridge maintenance	46.4	9 %	+	More use of salt and higher temperatures will accelerate corrosion. Floods will make bridge upkeep more difficult.
- repair of frost heave damage	15.4	3 %	+	More rain and higher groundwater levels will worsen frost heaving and increase the need for repairs.
- maintenance of fixtures and equipment	20.2	4 %	0	
- improvement of the traffic surroundings	4.3	1 %	0	
Operative traffic management	**7.4**	**1 %**	0	The need to predict rains, winter storms, and floods will increase.
Renewal and expansion investments of basic road management	**25.9**	**5 %**		
Planning	**29.5**	**6 %**		
Total for basic road maintenance	**528.3**	**100 %**	+	

[1] direction of change: ++ = costs will increase significantly, + = costs will increase somewhat, – = costs will decrease, 0 = no change

Paved roads

Rut formation on paved roads was studied on the basis of Finnra's condition register data. Rut formation increased an average of 30–45 % in 2003–07 in central Finland and along the coast, but remained unchanged in eastern Finland and Lapland. Pavement wear was assessed by combining the condition register data and the Finnish Meteorological Institute's weather station data. However, the material did not reveal any clear links between weather conditions and pavement wear.

As winters become milder and rainier, pavement will be wet and bare longer, →

whereupon it will wear more quickly than it does during dry, freezing weather and especially under packed snow. More frequent thaw-freeze cycles will cause pavement to deteriorate and speed up hole formation. Inferior pavement in particular (old tarmac roads and macadam roads) is prone to hole formation. Frost thawing and a rising groundwater level will increase deformation of the road structure, which is especially visible as rut formation in the pavement and ridge formation between lanes on the lower-level road network.

Funding for pavement repair and patching has been increased in recent years, but the need is expected to continue growing strongly. The bitumen content of pavement has already been increased in order to slow the rate of damage formation.

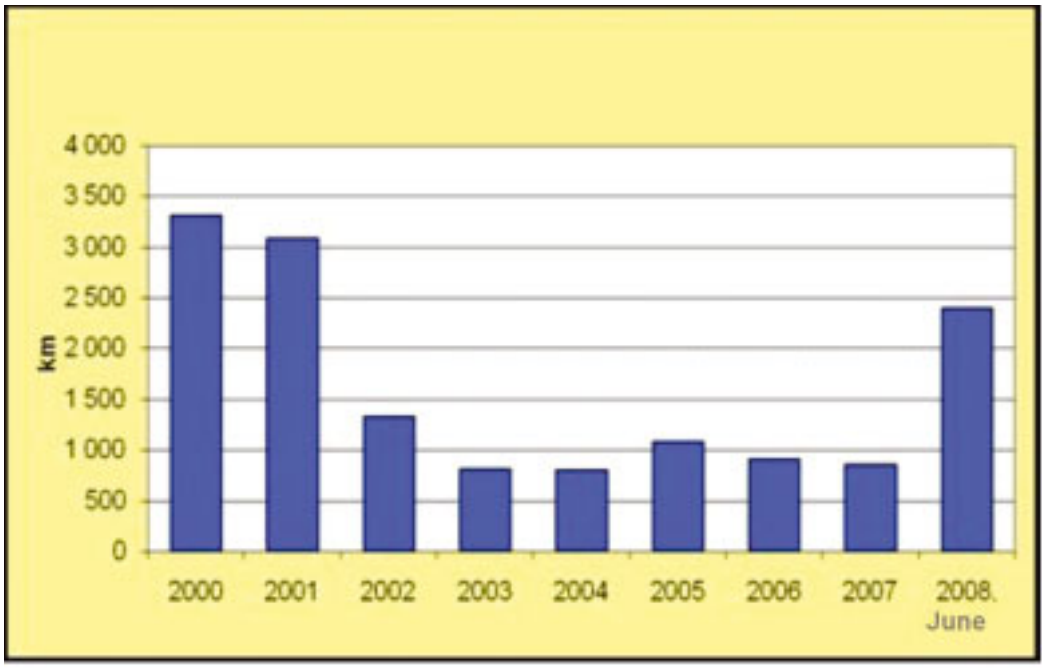


Figure 4. Extent of roads with weight limits due to frost heaving in 2000–2008.

Gravel roads

On gravel roads, climate change has the greatest effects on frost heaving. Increased precipitation, rising groundwater levels, and mild winters aggravate frost heaving.

In the years preceding 2008 the extent of roads with weight limits due to frost heaving decreased (figure 4). The reasons for the long period of less frost heaving are repairs made to frost-susceptible roads, lower-than-average groundwater levels, favorable winters, and very sunny springs.

In the spring of 2008 the extent of roads with weight limits was nearly three times that of the previous years. The reasons for this are, above all, increased precipitation, higher groundwater levels, and slow frost formation. What's more, the weather when the frost was thawing was normal, contrary to the previous few springs, when sunny, windy weather alleviated the effects of frost heaving. For this reason, frost heaving in the spring of 2008 well depicts springtime frost heaving as climate change advances.

The degree of difficulty of frost heaving is affected by many independent factors, therefore yearly variation in the degree of difficulty of frost heaving in years to come will be significant.

The years 2006–08 were characterized by a large amount of frost heave damage caused by abundant rain. In the autumn of 2006, weight limits were placed on about 430 kilometers or roadway, which is around 50 % of the total amount for the whole year. Weight limits were placed on about 190 kilometers of roadway in the autumn of 2007 and January 2008. Very little autumn and wintertime damage has appeared during ordinary years. Autumn damage is expected to become

The amount of plowing along the southern and western coasts in the winters of 2006–08 decreased compared with previous years, but no significant changes were observed elsewhere.

more common due to climate change. More autumn damage has also increased the use of aggregates to alleviate the damage.

According to measurements of the level of service, the most gravel roads in poor condition are found during dry summers, when the proportion of loose material grows and the roads are dustier than normal. Because of climate change the number of hot summer days is expected to increase, which will make summer maintenance of gravel roads more difficult. On the other hand, summer rains will become heavier, possibly increasing erosion of gravel roads.

The lengthening of the summer maintenance period in the spring and especially in the autumn will affect gravel road maintenance more than summer weather. As winter and frost are delayed, it will become increasingly difficult to keep the roads in good condition for winter. During warm periods bare gravel roads will need to be maintained as gravel roads in the middle of winter.

Changes in operating methods and costs

The study did not reveal any significant immediate need to modify maintenance guidelines. The effects of climate change were already taken into consideration when the operating policy was renewed. However, the issue should be kept in mind whenever the policy is updated for other reasons. Climate change and its impact need to be monitored and analyzed continuously.

Due to climate change, the general practices and procedures currently in use in southern Finland are gradually shifting further north. In many cases maintenance will become more expensive and require additional funding. Some products will also bring savings. Estimation of euro figures is difficult and depends on the time perspective in question. Large yearly variations often make it difficult to identify longer-term trends. Regionally, the changes may have opposite effects.

A study of the impact of climate change on road care and upkeep was conducted as a part of Finnra's Transport System Economy research program. Particular attention was focused on winter maintenance, pavement maintenance and gravel roads. The study also assessed the effects of changes on the state and condition of the road network and on operating methods and costs. The results are based on a literature review, an analysis of the effects of two mild winters in 2006-07 and 2007-08, and specialist assessments. The study was conducted by Destia Oy and the Finnish Meteorological Institute. ■

Photo Rodeo.fi/Juha Tuomi.

KAPU project tested mitigation potential of new cleaning equipment. Promising results were found for the street scrubbers, which combine high pressure washing and subsequent suction of the sludge.

Road dust problem is a complex issue, which needs careful management

The road dust problem is a complex issue, which can be controlled only through careful management of winter maintenance (including traction control), dust binding and efficient spring cleaning. The cities concerned should survey all their practices, materials and equipment and optimize them from the dust mitigation point of view. KAPU research project provided information to support this work.

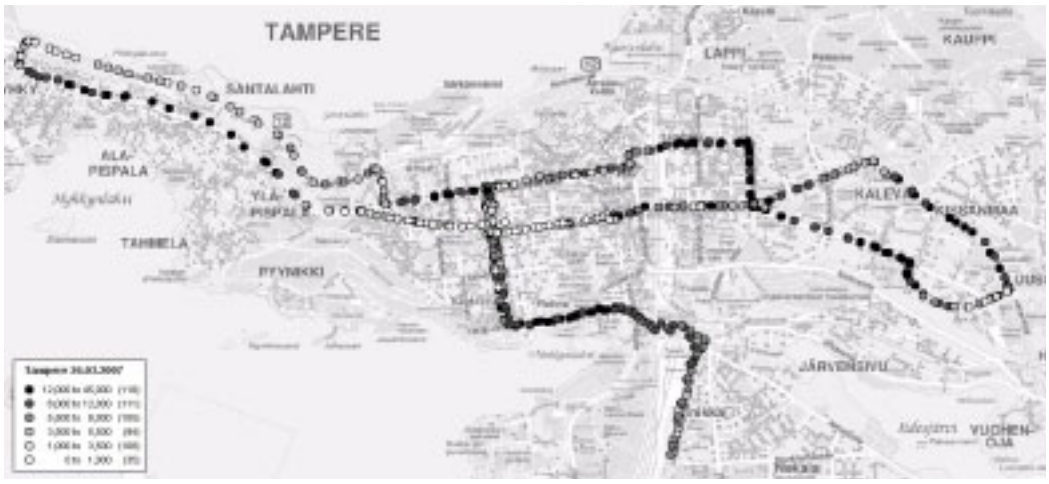


Figure 1. Respirable road dust on the streets of Tampere in 26.3.2007 in µg/m3 (micrograms per cubic meter). The streets in the city center had relatively low emissions (pale circles) the "hot spot" streets with high emissions are plotted dark.

Road dust is composed of mineral particles from pavement wear and/or from traction sand that accumulate in the road environment during winter. In spring when snow and ice melt and surfaces dry out, traffic activities make the particles airborne.

Road dust is a major source of urban air pollution during spring in the sub-arctic regions of the world, e.g. Scandinavia, Baltic, North America and Japan. In Finland it is still considered to be one of the most difficult air pollutants, although the Finnish municipalities have done much effort to mitigate it.

However, the efforts have not been enough to meet the limit value of respirable dust (or PM10, which refers to the mass of dust with particle size smaller than 10 micrometers in diameter), required by the EU directive (2008/50/EC) and e.g. in Helsinki the limit value was exceeded in 2003, 2005 and 2006. The city of Helsinki has informed the ministry of Environment and further European Commission according to the directive.

In 2003 the exceedance was argued to be due to road sanding. Based on the information provided by the city of Helsinki, the EU commission approved in 2006 that the exceedance could be attributed to dust following winter sanding. The limit value has not been exceeded in 2007 and 2008.

Road dust research in seven Finnish cities

A research project (KAPU, 2006–2009) was set up to study efficient road dust mitigation methods in the cities of Helsinki, Vantaa, Espoo, Kerava, Tampere, Riihimäki and Turku. Altogether the cities have a population of about 1.5 million inhabitants. Studies were performed on selected road routes.

The measures of winter maintenance and road cleaning were done according to the current practice taking into account the needs of the research. All operations were registered (e.g. sanding, salting, ploughing and cleaning).

Additionally, new and/or more effective cleaning methods, the effect of construction works as well as different pavements and tyres on road dust emissions were studied. Thorough data of air quality and meteorological parameters was available and used in interpreting the results.

Road dust emissions were measured with the SNIFFER-vehicle, which is a mobile laboratory to study traffic emissions of air pollutants. SNIFFER is managed and maintained under Helsinki Metropolia University of Applied Sciences. SNIFFER measures respirable road dust (PM10) emissions close behind the left tyre and it can be operated in the traffic flow.

The measurement results from SNIFFER can be plotted as maps (as shown in Fig. 1) from which the locations with high dust load (hot spots) can be identified. Results from different days can be combined with the book keeping on cleaning and other mitigation measures to study the efficiencies of individual mitigation methods in reducing road dust emissions.

A wide dataset information of springtime road dust problems was produced during the project for the participating cities. Substantial differences between different cities and individual streets were observed. The reasons of these differences were further studied.

Is the cleaning equipment able to remove respirable dust

One of the main aims of the project was to find out why the road dust concentrations are high also immediately after cleaning. The conclusion was that much of the cleaning was done with equipment not designed to collect and contain respirable sized fine dust. The equipment may even mobilize deposited dust and therefore high concentrations may occur after cleaning measures.

As an individual method high pressure washing was able to reduce the dust levels somewhat but current equipment was not found to be very efficient for acute mitigation of respirable dust. However, in the long run it is beneficial to remove the coarse dust and debris from the street environment. This reduces the risk that new fine dust is formed from sand and dust grains.

The project tested mitigation potential of new cleaning equipment. Promising results were found for the street scrubbers, which combine high pressure washing and subsequent suction of the sludge. The high pressure washing system (pressure, number and aiming of the nozzles) must be optimized to remove the dust and debris from the small scale cracks and holes of the pavement surface and thus reductions of respirable dust emissions occur. However, the equipment has to be operated and maintained well.

It is also good to pay attention to the dust concentration of the air that comes out of the cleaning equipment during cleaning so that the dust is not dispersed back into the street environ- →

Kaarle Kupiainen, Manager, Ph.D.
Nordic Envicon Oy

Jari Viinanen, Environmental Inspector, M.Sc.
City of Helsinki, Environment Centre

Liisa Pirjola, Ph.D., docent
Helsinki Metropolia University of Applied Sciences

ment after removal from the surface. Our studies showed that more advanced filtering techniques were able to remove respirable dust from the outcoming air. An issue to note from the air pollutant emission point of view is also that more modern engines have lower exhaust emissions than older ones.

Dust from construction activities

After the cleaning the street surfaces may get dusty again if material is relocated from outside the street environment. This is often the case if construction activities or uncleaned pedestrian areas, unpaved streets etc. are nearby.

Some of the participant cities had large scale constructions under work during the study and their effect was clearly demonstrated in the results. It is advised that cities should introduce guidance on how to manage dust emissions from construction activities. Good practices were studied and produced during the project.

Self cleaning of street surfaces

Results showed that in late spring the streets clean up also without cleaning measures or rain. New dust formation is reduced because there are no studded tyres in traffic and sand and debris has been removed. In this situation the traffic lifts the respirable dust airborne and turbulence and air currents transport the dust away. However, the self cleaning is not an efficient removal process and therefore active mitigation is needed.

Dust binding - most promising mitigation method of road dust episodes

Winter maintenance should be improved especially for managing dust episodes early in the spring. Dust binding proved out to be most promising acute mitigation method for road dust episodes. Road dust episodes occur when the surfaces are dry. Dust binders suppress the dust emissions by binding the dust particles into larger aggregates and to surfaces. Dust binding can also be used at that time when frozen roads cannot be cleaned.

Our study showed that CaCl2 dust binding agent was effective in lowering dust emissions and ambient concentrations throughout the spring. Special equipment was constructed in Espoo, Helsinki and Vantaa in order to spread the dust binding agents to hot spot areas like kerbside.

In kerbside up to 15 percent CaCl2-water solutions was used in one city. However, because the binders might cause slipperiness, on driving lanes only 5 percent solutions have been used. It should be noted that dust binders do not remove the dust from the street environment and cleaning should be organized later.

Notes on winter maintenance

Special attention should be paid on winter maintenance measures in order to help the road dust situation especially in early spring. Road dust episodes start to occur as early as in February but cleaning activities that use water usually cannot be done before April because of sub zero temperatures and night frosts and subsequent risk of introducing ice to street surfaces.

Winter maintenance activities such as ploughing and snow removal potentially affect the dust deposit. Dust containing snow piles should be removed before the dust is released.

Earlier studies have shown that special attention should be paid on street sanding, for example its amount, physical properties (grain size and quality) as well as dispersion practices. Traction sanding should be used only in locations where really needed, such are crossings, hills and bus stops. Special materials could be used in more sensitive areas.

In early spring when water cannot yet be used, dust emissions can be lowered using dust binders. Also dry cleaning methods, e.g. mechanical brooms could be used to remove sand and larger debris.

Although street sweeping and washing are not necessarily efficient in reducing PM10 in the short term, they remove the coarser dust and debris that may be fragmented into smaller sizes. This also applies to traction sand in the road environments. Therefore the street cleaning methods should be applied as soon as possible to remove the traction sand deposits.

The cleaning measures should be applied to the whole street environment, including curbs, center dividers and pedestrian areas. New equipment that is more efficient in removing respirable size road dust should be promoted and used especially in more sensitive areas, e.g. urban canyons.

Road dust problem is a complex issue, which needs careful management

The road dust problem is a complex issue, which can be controlled only through careful management of winter maintenance (including traction control), dust binding and efficient spring cleaning. Many cities face trends, for example increasing traffic amounts that may lead to increasing dust emissions if special attention is not paid to the issue.

The cities battling with the road dust problem should survey all their practices, materials and equipment and optimize them from the dust mitigation point of view. Such surveys could then be used as material to produce best practice guidance and regulations to cities and municipalities. This might require that more resources are allocated to dust mitigation but often optimizing current practices could be enough and as a matter of fact enforcements in some practices may lead to savings in others.

The mobile measurement approach can be used as a quantitative quality control tool to manage the dust mitigating actions as well as to identify hot spot locations, which require special attention and enhanced cleaning measures perhaps throughout the year. It can also be used to identify the equipment that has most potential in reducing dust emissions. Such service could be used for example by the cities. ■

Dr Kaarle Kupiainen leads the Air quality and climate business unit of Nordic Envicon Oy, which provides research based knowledge and management solutions to mitigate air pollutant related problems. Dr Kupiainen has a 10 years experience in road dust issues.

Development and prospects of road maintenance machines

CEO Ossi Willman (ret.)
Destia Kalusto Oy

Transport infrastructure shall be in decent condition all year round. This is the requirement of society's transport needs. Therefore road maintenance machines must be developed continuously and goal-directed.

The overall aim in R&D activities related to road equipment was until the turn of the century mainly quality of the work, observed on the road surface. When road maintenance opened to competition about ten years ago various multi-purpose machines started to compete with for example motor grader on the maintenance of low-volume roads. Then as well as quality even other criteria became important: cost efficiency.

Focus on ploughing breadth

R&D concerning winter maintenance equipment was dealing a long time with snow throwing capabilities of snow plough to enable increased ploughing speed considering damages to road signs. Now development is focused more on making ploughing breadth larger. Today even two lanes can be ploughed using one frontplough-sideplough combination. In favourable

→

Photo Ossi Willman.

Modern equipment of Destia.

conditions breadth can be even 7.5 m. When so wide unit is on the road essential thing is to warn traffic, using working zone-indicators.

Using such a wide ploughing combination enables shortening operation time at lower costs. Even fewer trucks are needed. This means also less disturbances to road users.

Use of motor graders decreased

Earlier packed snow was removed using motor graders. Today blades under trucks' chassis have been developed suitable even for removal of packed snow and other heavy-duty operations. Therefore use of motor graders has decreased significantly. Many road maintenance contracts can be performed even without a motor grader. Or several contracts use one motor grader.

Ploughing and especially removal of packed snow cause damages to road markings. Materials have been developed more durable. Even maintenance machines have been developed more "road marking friendly". Use of pressure battery smoothens contact with the surface saving road markings.

Traffic tractors enable increase of subcontracts

In winter maintenance use of so-called traffic tractors (which are allowed to drive at higher speed than agricultural tractors) have become more and more important especially in maintenance of low volume roads. In rural areas many farmers have made subcontracts with main contractors. This has given substantial extra earning possibilities to them.

Domestic manufacturers have paid extremely well attention to R&D work of tractors and its accessories. Results have been seen among others in exhibition and demonstrations of Winter Road Congresses in Finland. One example of this work is so-called "packed snow mill" but even other accessories has been developed - partly to replace motor grader.

Development of hydraulically adjusted drag suitable for tilling of gravel roads has been development, which has saved especially capital costs.

More accurate salt spreading

Ice control is an important part of winter road maintenance. In winter maintenance general environmental requirements have become more and more important. With these requirements traditional sanding equipment has been replaced by sanding automats, where moisturizing and dosage of salt are of primary importance. Also reporting has improved with new technologies of communication.

Automatic machines help earth construction

Automatic machines have made their entrance even to earth construction in recent years. They save money and time, when certain working phases like marking of heights are done automatically. Also transmission of recordings of various working phases can be made automatic. Hence the whole working process can be monitored more closely and in-time.

In the future automation and various innovations involved may increase productivity of the sector. It is, however, important to develop norms and standards to make systems and equipment compatible.

New tires save environment

If road maintenance equipment has developed, so has equipment in general. One example of this is development of tires for working machines. Tough competition and continuing R&D efforts have created winter tires, which are more suitable for harsh working conditions. They are more environmental-friendly because it is not necessary to use anti-skid devices like snow chains to such extent as earlier.

What are prospects?

What kind of maintenance equipment is needed in the future? There are at least two main lines of development needs.

On motorways and other roads and streets, where traffic is heavy, maintenance operations shall cause as little disturbance to the traffic as possible. Best solution for effective maintenance is road maintenance truck equipped with versatile accessories. This minimizes the time, which the truck is on the road, snow removal and ice control is effective.

In rural environment, on low-volume roads, lighter equipment is more useful. Traffic tractor with ploughs and sanding equipment may be best solution there.

Even if future is always uncertain, one thing is obvious. In the R&D work of maintenance machines stricter environmental requirements shall be taken into account. They play important role in the bidding competitions. On the other hand contractors shall be competitive and efficient, which poses growing challenges. After all, our common aim is to keep environment clean and unpolluted. ■

(A slightly summarized translation of an article published in Tie ja Liikenne 10/2008, publication of the Finnish Road Association)

Ville Alatyppö,
M.Sc., D.Sc. Candidate
One of the research fellows behind the development of Betafrost

Kirsti Jutila, M.Sc.,
Business Manager
Finnfeeds Finland
Danisco Ltd

Totally new de-icing chemical, betaine (trimethylglysine) is pure natural product, which is produced from sugar beet. Betaine exists all over in the nature, also in the human body.

Betaine is already in use in cosmetics, dental and food industry, animal feed, etc. Betaine production takes place in Finland by Finnfeeds Finland Ltd belonging to Danisco A/S.

Now after a long-term research work, betaine has been approved also as de-icing chemical. For de-icing application, the brand name is Betafrost, and it does not contain any additive chemicals, such as corrosion inhibitors. The production and applications of betaine are patent protected (EP 1034231).

Examined natural product

Betaine differs remarkably from present de-icing chemicals; it is non-toxic, biodegradable and it is not known to have any harmful environmental effects.

The most noteworthy property of betaine is that the metal corrosivity of betaine is remarkably low. In addition, betaine has no effect on carbon brakes.

The effectiveness as de-icing chemical has been carefully examined; the ice melting effectiveness studies

Betafrost - A natural de-icing agent

started in the year 2003 in the Helsinki University of Technology and metal corrosion properties have been investigated by Finnish Air Force from the year 2004. Totally 11 different articles have been published about the ice melting effectiveness, also including practical experiences.

Salt and urea

At present, normal road salt - sodium chloride - is used in the winter maintenance of road network. Ice melting effectiveness of road salt is superior against all other chemicals.

Road salt could not be used at airfields, since sodium chloride corrodes heavily airplanes. Nowadays different acetates (acetic acid salt) and formates (formic acid salt) are used in runways.

These new agents were taken into use since urea eutrophicates water systems and it is active in a very narrow temperature range. Without this negative impact on the environment, urea was successfully used many decades in anti-skid treatment on runways.

Acetates and formates

For the past five years commercial aviation companies and especially Air Forces around the world have been struggling with remarkable corrosion issues in their airplanes. This is caused by these new chemicals, acetates and formates and it has significant safety magnitude of the aviation.
Acetates and formates have also shown to have a negative effect on the durability of asphalt pavements. Because of these reasons, Swedish Air Force has already abandoned the use of acetates and formates. And Finnish Air Force is going to reduce remarkably the use of these chemicals.

Betaine

For the last year, many airline companies and aircraft manufacturers have been interested in betaine, since the amount and severity of corrosion issues and damages in carbon brakes in aircrafts have increased remarkably due to the effect of used agents.

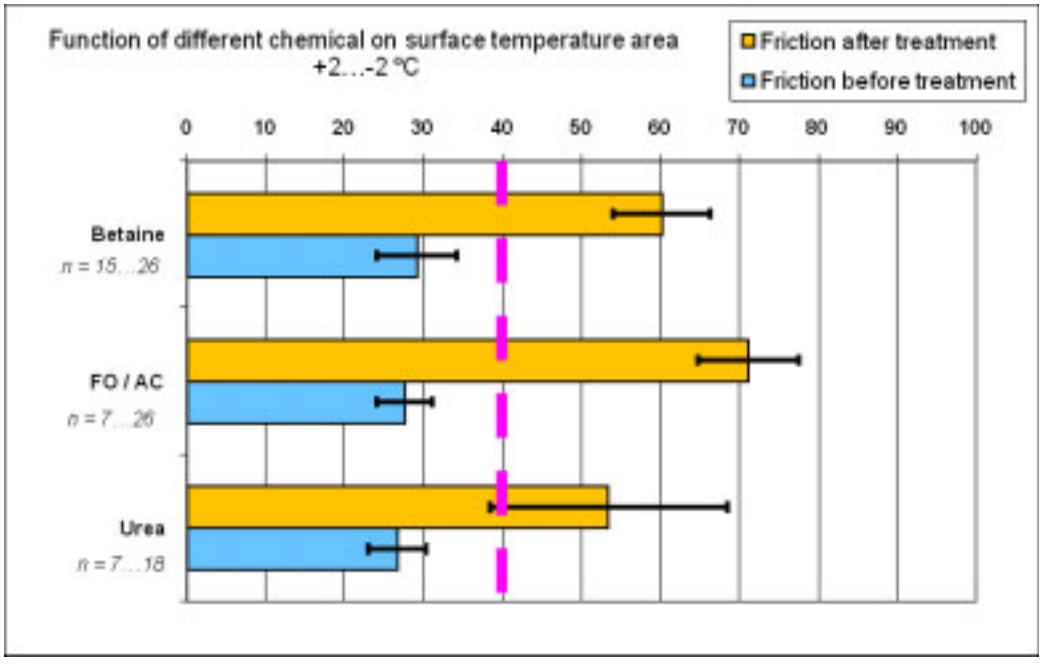
Studies made at the Helsinki University of Technology have shown, that even though the ice melting capacity of formates is around two times bigger than the one of betaine shown in the laboratory tests, betaine could be used as reliable de-icing chemical.

Field tests and practical experiments (friction tests) have shown that in the real anti-skid treatment, betaine is more effective compared to urea.

Betaine is applied in liquid form and when additional solid de-icing chemical is needed, sodium acetate has been used.

Betafrost, as liquid de-icing agent, has been used on three airfields in Finland for the past three winter seasons. Maintenance personnel have been satisfied after they got to know of the performance and properties of betaine. After betaine trials started the number of corrosion cases in military airplanes has decreased remarkably.

Even though additive free Betafrost has already been used successfully in winter maintenance and it is now on the market, development work still continues. In this work the airfield personnel will be listened carefully to achieve constant improvement for safety matters, practical usability etc. Target is to maintain traffic areas efficiently and safely to save both environment and money. ■



Friction levels with 95 % confidence intervals of different chemicals when anti-skid treatment is being performed. Friction requirement of the runway is 40 in Finland and the requirement is fulfilled also with betaine, even though it was not as effective as formates in the laboratory.

Utilizing ICT ensures good quality in winter road maintenance

Sampo Hietanen, Director, Ventures
Destia Ltd, Solutions

7 Satellites, 8 radar units, 347 road weather stations, 1 super computer, 1 100 road maintenance units. It only takes one person to orchestrate this circus of high technology. One person is capable of supervising maintenance of even half of Finnish public roads within one hour´s operation time and control all the information involved. Does it sound impossible?

Road maintenance is a service that ensures safe and fluent traffic in all conditions every day and every hour. There is vast amount of information behind any maintenance operation. In addition to good information accurate forecasts are needed to plan correct measures.

Almost everything from analysis to information delivery has been automated so that the maintenance operator can concentrate on essential: making right decisions at right time.

Information and mobile technology have made road maintenance more effective the last two decades and in practice changed the whole industry.

Destia is the leading road maintenance contractor in Finland with over 50 000 kilometres of roads to maintain. There are over 1 500 units that are controlled from the road weather centre.

The most essential services and applications used in road maintenance are:

Road Weather Centre The joint venture between Destia and Finnish Meteorological Institute is the hub and intelligence behind high quality maintenance operations. Road weather centres provide accurate information of road weather to predict situations and to ensure the right maintenance measures. In Finland winter season starts in October and ends in May, and during that period the centres operate 24/7.

90 % of the de-icing operations are preventive to ensure friction at all times and to minimize salt usage per operation. The maintenance decision supporting system relies on information gathered from weather models, weather radars, road weather stations and road weather cameras.

Road weather stations are spread throughout the traffic network and they provide information for example on temperatures above and on the surface, frictions and the amount of salt on the road.

Keiju System gathers all necessary information from the operating units for reporting and operating. There is a system meant for own equipment and a light version for sub-contractors. Keiju System recognizes all operations and locations automatically and sends the information to the road weather centre. In the light version sms is used to gather information about operations on a specified route.

Group Alert System enables simultaneous alerting of drivers. Road weather centre operator marks the operation and picks the

Road weather centres provide accurate information of road weather to predict situations and to ensure the right maintenance measures.

Keiju System gathers all necessary information from the operating units for reporting and operating.

teams or individual drivers to whom the order will be sent. The message is then transformed into speech and a receipt is asked from the recipient. The operator can easily monitor the actions from the screen.

Road Channel Service is a service for road users who can join in the maintenance process by leaving their remarks on an internet map. Road users are a good source of information to spot changes in the network. Involving users also increases customer satisfaction.

Mobile services for road users are a relatively inexpensive way to keep road users informed about the conditions on their route.

ICT has improved the road maintenance process at least in automation of reporting, reducing the amount of offices and office staff, fleet control, sub-contractor supervision, quality control and customer relations.

The savings made in Destia alone are substantial: reduction of office staff of over 300, reporting time per individual per day from 0.5 hours to 5 minutes and numerous savings in process improvements. ■

70 years for safer and more fluent winter traffic

Winter Road Congresses in Finland are something special

Secretary General
Jouko Perkkiö Finnish Road Association

History of Winter Road Congresses in Finland has its origin in the early 30´s, when Finnish road network was basically intended for horse-drawn wagons. The number of motor vehicles had, however, started to increase rapidly and construction of proper roads commenced.
– Maintenance of roads, especially winter maintenance was those days almost unknown activity. Major part of roads was snow-covered for 4-5 months a year.

Even if times have changed in many respects from those days and roads are now open for traffic year around, all problems have not disappeared. Darkness, poor visibility, slippery, icy roads, fast changing weather, snow and sludge on the road: all these factors increase risks in winter time.

Because people have to go to work and goods transport has to move on even in bad weather, finding solutions to the winter time hazards is very important.

First Winter Road Congress was organised in Helsinki especially with aim to create cooperative spirit among various administrations to arouse their interest in this dilemma. It may be surprising that starting point was development of cooperation between governmental administrations (road & water, post and telecommunication, defence, provincial administration etc), not technical issues.

The programme of this first event included a seminar, exhibition and demonstrations, which is much the same as it is today. The event attracted a surprisingly large group (350) of participants, among them many dignitaries like ministers, director generals, mayors etc.

It is reported that attractions of the exhibition included snow-ploughs, a new motor grader and "Snowking" snow-plough equipped with snow rotor, made in USA.

Maintenance equipment demonstrated their abilities on sea ice outside Helsinki.

Snow-plough Committee gave valuable contribution

Even if all parties involved were enthusiastic about improving winter maintenance in Finland, major interval occurred due to World War II and its aftermath.

In the late 40´s a special "Snow-plough Committee" was set up with specific task to develop snow-removing equipment. It drew members from road administration, technical universities and small companies. In co-operation – even experts from other Nordic countries participated – this Committee made valuable research and tests in developing equipment. Innovative and enthusiastic spirit dominated during those pioneering years.

Winter Road Congress gathers experts

Winter Road Congress in Finland is today main plat-

28. Winter Road Congress in Finland will be held in famous winter sports city Lahti on 26-28 January 2010.

Mr. Mauri Pukkila, Road Director of Finnish Road Administration Häme Road District is also Chairman of the Organisation Committee. He welcomes all road professionals warmly to Lahti in January 2010.

form in Scandinavian and Baltic region, where road maintenance professionals meet every other year to find solutions to the problems outlined above.

The Congresses are organised by the Finnish Road Association, Finnish Road Administration and hosting City. Also major maintenance contractors are involved in the organisation.

Finland has been honoured twice to host PIARC International Winter Road Congress, in 1973 in Jyväskylä and in 1986 in Tampere.

Today Nordic countries work in close cooperation in issues related to maintenance management, research and technical innovations and high quality of maintenance in these countries is acknowledged worldwide. Therefore, Winter Road Congress in Finland has attracted in recent years growing number of international participants. Official languages of the Congress are English, Finnish and Swedish.

Next time in Lahti 2010

28. Winter Road Congress in Finland will be held in Lahti Fair Centre on 26-28.1.2010.

In technical session main focus will be this time in quality of winter maintenance, weather services, road conditions and information to road users and how they affect road safety. Also winter maintenance equipment, methods and materials will be discussed.

The Congress is three-lingual (Finnish, English, Swedish). The programme includes technical sessions, social program, exhibition and demonstrations.

The City of Lahti occupies an ideal logistic location in the centre of Southern Finland, with good traffic connections to other parts of Finland. Lahti is only an hour`s drive away from the greater Helsinki region and Helsinki-Vantaa international airport. With the new Helsinki-Lahti railway the train-trip to Helsinki takes only 48 minutes.

Registration to the Congress and Exhibition starts in August 2009. Please visit our website www.tieyhdistys.fi for further information. ■

Finnish transport administration is under reform

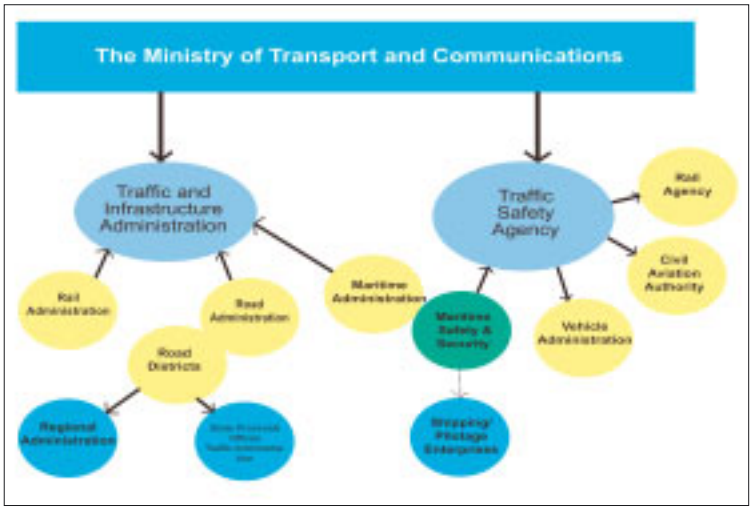
The history's largest reform of state regional administration in Finland is currently prepared. At the same time also the whole transport administration is reorganized. These simultaneous reform projects lead the present transport administrations in two super agencies. New agencies begin their work on 1 January 2010.

The large reform aims at customer-oriented, productive and efficient regional administration. The objective is to clarify division of labor inside the authorities of the regional administration as well as between the regional administration and ministries and other central administration.

As the result of the reform project of State Regional Administration there will be two new agencies: Regional Administration Agency and Regional Centre for Transport Services, Environment and Industry. In to these will be incorporated the present County Administrative Boards, Employment and Economic Development Centers, Road Administration Regions, Regional Environment Centers, Environmental Permit Authorities and Labor Safety Districts.

The objective of the Transport Administration Reform is ambitious: uniting operations will bring synergy benefits, more productivity, more efficiency and especially comprehensive approach to transportation system. Comprehensive transport policy drafting and implementation will be strengthened and resources allocated more efficiently.

The reform means that there will be two new transportation agencies instead of the present seven. →



New government agencies.

Transport and Infrastructure Agency comprises the Rail Administration, the Road Administration, excluding the road districts and functions to be transferred to the Transport Safety Agency, the duties of the Maritime Administration that will not be transferred to the future state-owned company specializing in production or incorporated into the Transport Safety Agency.

The mission of the Transport Infrastructure Agency is, in cooperation with its interest groups, to ensure that Finland has an effective, energy-efficient, environmentally friendly and safe transport system serving the travel and transport needs of people and businesses and to secure the competitiveness of Finland and its different regions.

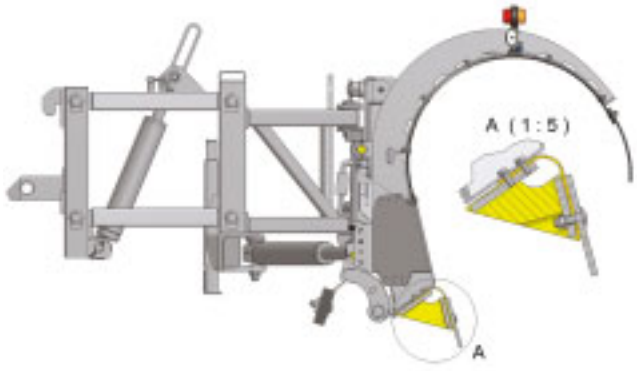
The new Transport Safety Agency will comprise the Vehicle Administration, the Civil Aviation Authority, the Rail Agency, from the Maritime Administration the maritime safety function, administrative duties for pilotage, the role of the competent authority in vessel traffic services, and vessel register maintenance, the functions of the Road Administration related to the issuing of road safety standards and rules and to the monitoring of road maintenance safety regulations.

The Transport Safety Agency will be responsible for transport system regulation and supervision tasks, for developing transport system safety and security, and for mitigating and preventing adverse environmental impacts of transport.

The new agencies able new common best practices. Defining common concepts are expected to ease cooperation with service producers and partners. Also possibility to share and extend know how is one of the synergy benefits. ■

Contract profitability depends on road maintenance equipment

Investing in road maintenance equipment requires special kind of expertise and know-how. Proper equipment selection is a prerequisite for successful road maintenance work. Ensuring that the equipment range is suitable for different road network levels requires acquiring thorough information on different equipment types. Geographical location, road width, surface material as well as quality and its assurance have an effect on equipment selection.



Comprehensive service that pays attention to special requirements

Arctic Machine Oy's products are well known among road maintenance professionals for their high quality and state-of-the-art applications. The key goal of the road maintenance equipment design is to improve road maintenance quality and efficiency. Arctic Machine Oy has substantial experience in road maintenance work and the development of road maintenance equipment.

Arctic Machine Oy has its own design, manufacture, and marketing departments, which guarantees a direct, mutual relationship with the customer. Design and assembly services for the hydraulics; maintenance and spare part services; usage training; blade servicing; and financial services provide keys for successful road maintenance work.

Snow and its removal, slippery conditions and the anti-skid work as well as their environmental impacts provide great possibilities for developing equipment, which at the same time protects the environment, increases safety, and improves the road maintenance professional's profitability. Modern road maintenance work must also take into consideration environmental trends.

New plow range for clean roads

The elastic blade structure that has no mechanical parts protects road markings and decreases plowing noise. Clean plowing outcome is based on the polyurethane blade that softly follows the road inclinations as well as the double blade usage.

Thanks to the clean plowing outcome, severe anti-skid treatment is not necessary. Since less sanding is required in winter, springtime sand removal costs are also decreased. Furthermore, less brine is required, which protects the environment.

Reliable partner helps throughout the contract

Successful road maintenance requires reliable partners - of which the equipment manufacturer has a key role. The manufacturer is not only responsible for equipment delivery but also for ensuring that their system works properly throughout the road network. Arctic Machine Oy helps their partners accomplish their goals - both functional and financial.

For more information, see: www.arcticmachine.com ■

28th Winter Road Congress in Finland Lahti, January 26-28, 2010

- International Congress
- Exhibition of winter maintenance equipment
- Demonstrations
- Social programme

Welcome!

ORGANISERS: Finnish Road Association
Finnish Road Administration, Häme Region
City of Lahti

Further information: www.tieyhdistys.fi