

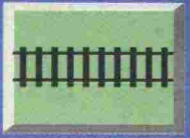
DEVELOPMENT OF THE NORDIC TRIANGLE RAILWAY NETWORK IN FINLAND



CONTENT



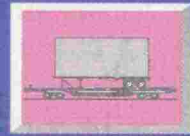
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1997



FINNISH
RAIL
ADMINISTRATION



The creation of the Trans-European Networks (TENs) is one of the objectives of the EU in the development of transport infrastructure.

The EU has identified 14 primary TEN-transport projects. The Nordic Triangle is one of them.

The Nordic Triangle is a transport system of different modes which links the capital cities of the Nordic countries to each other and provides connections between the EU and Russia.

The Nordic Triangle in Finland is a west-east transport corridor from Turku to the eastern border.

The railway network of the Nordic Triangle in Finland will be developed so that travel and transport times will be decreased, the bottlenecks of traffic will be removed, traffic safety will be improved and the competitiveness of railways will be promoted.

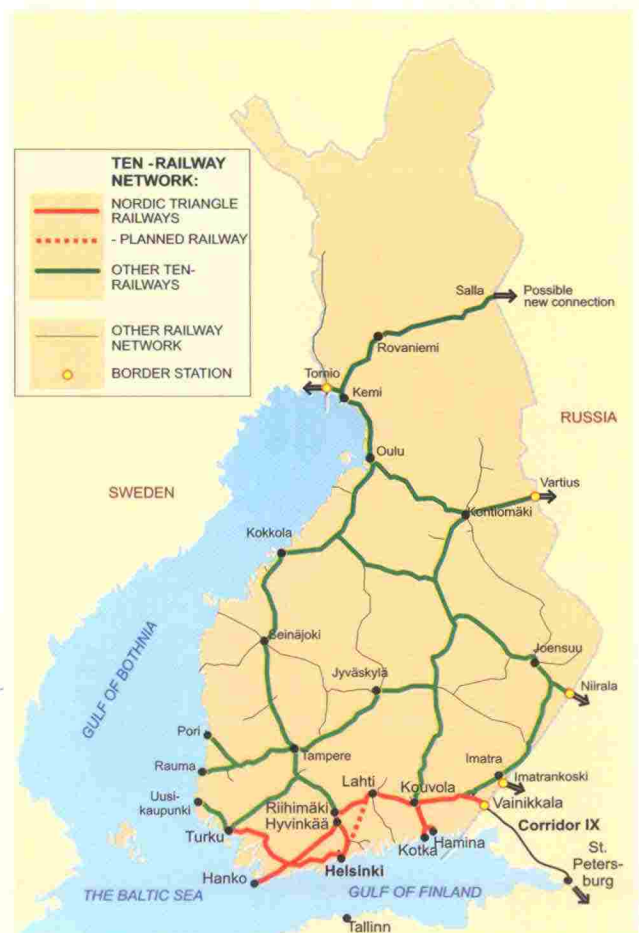


NORDIC TRIANGLE - LINK BET

International Transport Networks are being developed in Europe

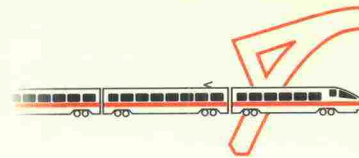
The development of transport connections is one of the central goals of the European Union for securing competitiveness, economic growth and employment. The plans of the EU include the creation of trans-European networks (TENs) which will promote the internal market operations and improve connections to the neighbouring countries of the Union. This presumes efficient and environmentally friendly traffic and transport systems which connect European regions to each other.

The trans-European networks include all modes of transport and they will be implemented by the year 2010. The EU presumes that the member countries will consider the guidelines provided by the Union in developing their transport networks and will set high priorities to projects which are important for the Union.



TEN- railway network in Finland

The EU identified 14 primary TEN transport projects at the Essen Summit in the year 1994. Nine of these projects include railway development. The Nordic Triangle is a primary project which includes the development of the Nordic transport connections.



The goal of the EU is to promote the competitiveness of railway traffic by accelerating passenger traffic and making freight traffic more efficient. National starting points have been considered in the planning of the existing railway networks. The implementation of unified TENs presumes e.g. the improvement of border crossing operations and the harmonisation of technical systems between different countries.

International railway freight traffic corridors, the so-called Trans-European Rail Freight Freeways (TERFF), are being developed. It has been planned that the Nordic Triangle railways would constitute this kind of transport corridor in Finland.

Nordic Triangle Transport Projects

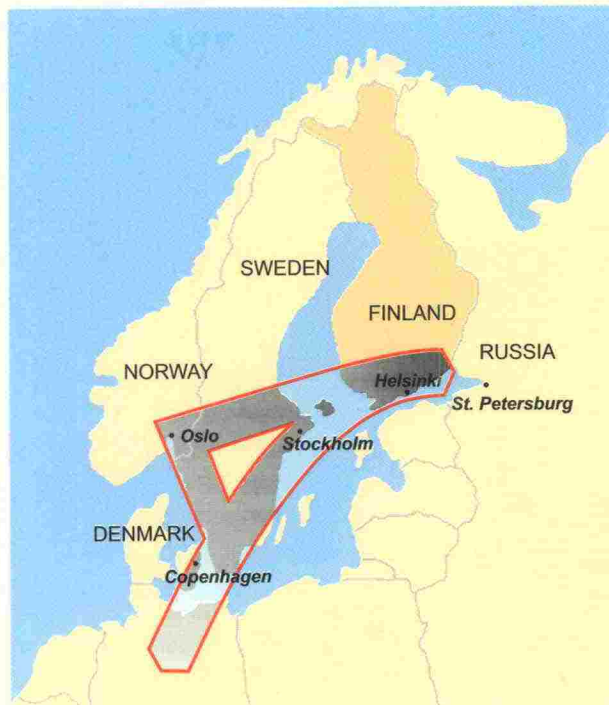
The Nordic Triangle is a transport system which links the capital cities of the Nordic countries to each other and provides connections between the EU and Russia. The Nordic Triangle is part of the west-east transport corridor, the Crete Corridor 9, one segment of which is Helsinki-St. Petersburg-Moscow.

The level of service of the different parts of the Nordic Triangle transport network will be increased by renewing and developing infrastructure. The transport corridors under development include Copenhagen-Malmö-Gothenburg-Oslo, Copenhagen-Malmö-Stockholm, Oslo-Stockholm and Turku-Helsinki-Vainikkala (Russian border).

The fixed link projects connected to the Nordic Triangle are:

- The fixed link over Öresund
- The road and railway link over the Great Belt
- The fixed link over the Fehmarn Belt between Denmark and Germany.

The Nordic Triangle will promote the competitiveness of the Nordic industry due to shorter export and

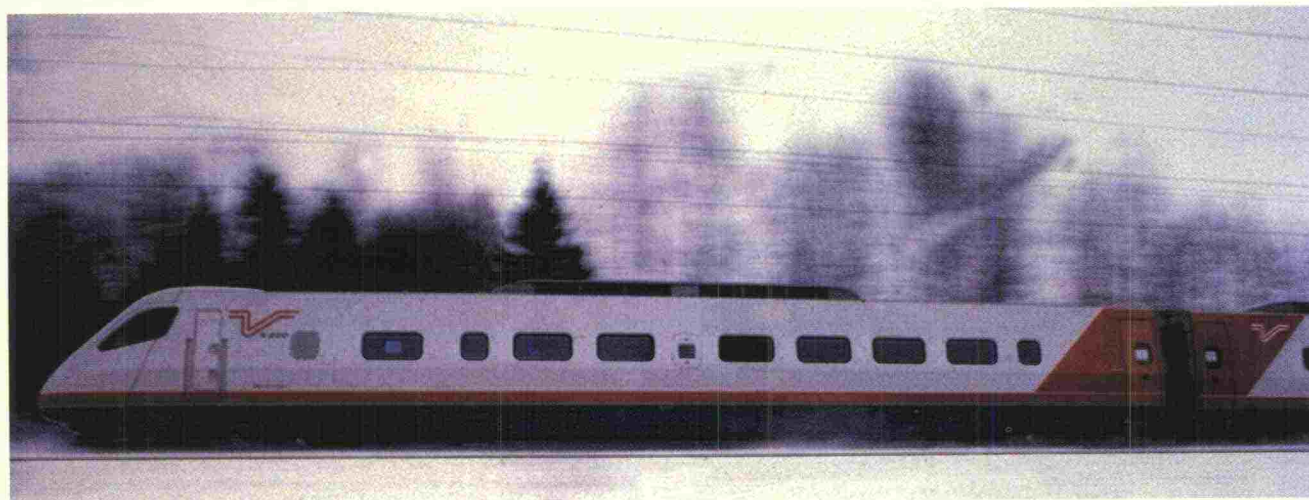


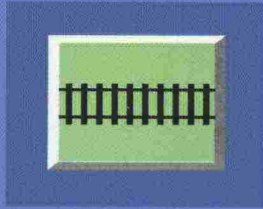
Nordic Triangle

import transports. Rapid passenger traffic connections will improve the travelling possibilities as well as support the operational conditions of business life and the development of the regional structure of the transport corridors.

The Nordic Triangle in Finland is a west-east transport corridor which includes Turku-Helsinki-Vainikkala railway and railway connections to the largest ports, European Road E 18, the most important ports on the southern coast, Helsinki-Vantaa airport and related supporting functions, as traffic management systems.

Finland is the only member state of the EU which shares a common border with Russia. The same rail gauge on the railway network in Finland and Russia provides good preconditions for developing the railway traffic between these countries.





The Nordic Triangle railway network includes the most important rail sections of line in southern Finland.

The railway investments mostly consist of the upgrading and development of tracks.

Projects providing more track capacity include double track between Inkeroinen and Juurikorpi the additional track between Luumäki and Vainikkala, city railways Helsinki-Leppävaara and Tikkurila-Kerava in the Helsinki Metropolitan Area and direct line between Kerava and Lahti.

The total need for funding of the Nordic Triangle railway projects will be 6,9 billion FIM during the years 1997-2010. A share of 4,8 billion FIM of it will consist of new development projects and 2,1 billion FIM of track upgrading.



NORDIC TRIANGLE RAILWAY PROJECTS

Railway Projects

The central sections of line of passenger and freight traffic in southern Finland are included in the Nordic Triangle transport corridor. The total length of tracks is 755 km.

The sections of line include

- Helsinki - Turku (194 km)
- Helsinki - Vainikkala (283 km)
- Kotka/Hamina - Kouvola (72 km)
- Hanko - Hyvinkää (148 km)
- Kerava - Lahti (58 km).

Investments on these sections of line primarily include the upgrading and development of tracks. The direct line between Kerava-Lahti is the only entirely new section of line. The upgrading of tracks consists of the renewal of the superstructure and safety equipment as well as changes in stations.

Development

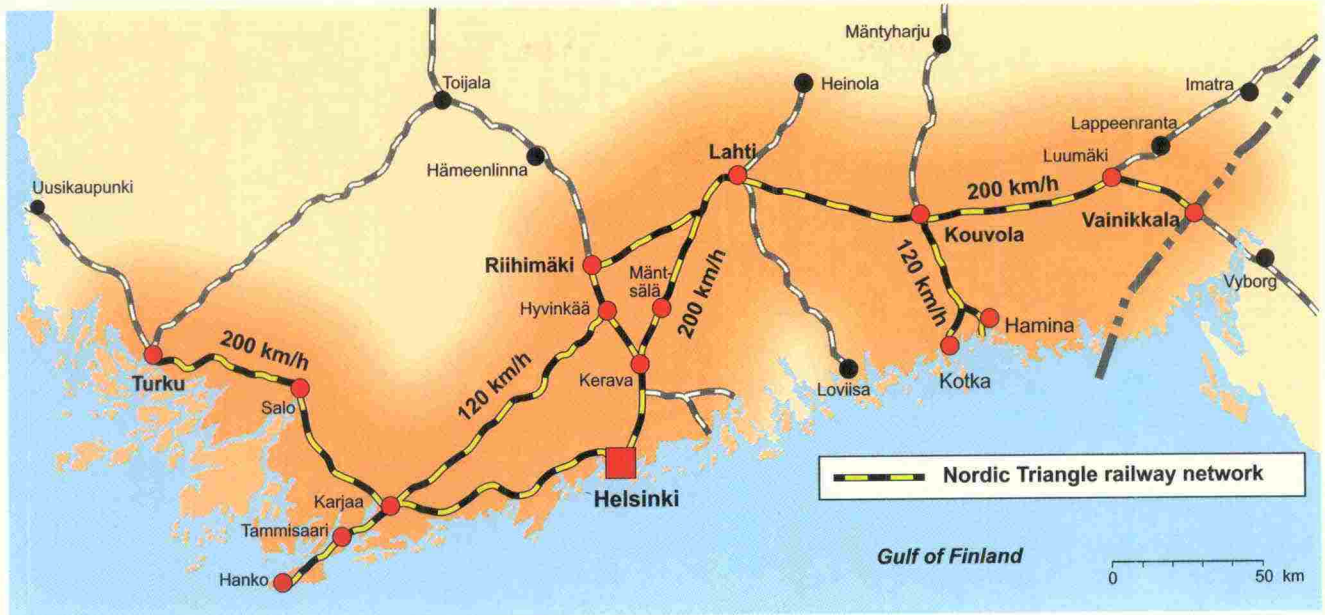
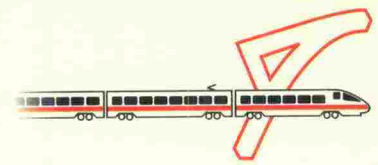
The ongoing development projects on the sections of line include the construction of a double track between Inkeroinen and Juurikorpi on the Kouvola-Kotka/Hamina section of line, the construction of automatic train protection system and the removing of level crossings.

Projects providing more track capacity include the direct line between Kerava and Lahti, the additional track between Luumäki and Vainikkala and the additional tracks or the city railways Helsinki-Leppävaara and Tikkurila-Kerava in the Helsinki Metropolitan Area. City railways provide separated tracks for long distance traffic and commuter traffic.

Section of line

Costs 1997 - 2010 (mill. FIM)

Helsinki - Turku	1 120
Helsinki - Vainikkala	3 290
- Hki-Riihimäki	1 330
- Riihimäki-Lahti	390
- Lahti-Kouvola	740
- Kouvola-Luumäki	310
- Luumäki-Vainikkala	520
Kotka/Hamina - Kouvola	320
Hanko - Hyvinkää	400
Kerava - Lahti	1 800
Total	6 930



Nordic Triangle railway network in Finland and maximum speeds of sections of line

Costs

Additional track capacity will enable a greater number of trains.

Track geometry will be improved between Lahti and Luumäki which will enable shorter travel times of trains.

Furthermore, the Hanko-Hyvinkää section of line will be electrified.

The total investments of the Nordic Triangle railway projects will be 6,9 billion FIM during the years 1997-2010. A share of 4,8 billion FIM of them will consist of new development projects.

Finland has received support for the planning and construction of the Nordic Triangle railway projects from TEN-budget of the EU and loan from the European Investment Bank.





The upgrading and development of railway network in the Nordic Triangle will enable the acceleration of passenger traffic and increasing number of trains. Railway connections will also be improved and accelerated outside of the Nordic Triangle transport corridor.

Shorter travel times and increasing number of trains will increase the number of domestic, long-distance railway traffic by 4 000-6 000 trips/day by the year 2010. Most of this growth is the result of passengers shifting from other modes of transport.

The development of international railway connections from Finland to St. Petersburg and Moscow will strengthen the gateway position of Finland. The travel time between Helsinki and St. Petersburg can be reduced from the existing 6 hours to 3 hours by improved railway network and rolling stock.



PASSENGER TRAFFIC

Domestic Traffic

The highest railway passenger traffic volumes in Finland have concentrated on the Nordic Triangle transport corridor. There are about 8 million annual domestic long-distance trips on this corridor. In addition, there are about 34 million trips in the railway commuter traffic of the Helsinki Metropolitan Area.

The upgrading of tracks and fast, tilting trains will decrease travel times by 20-40 % from the existing level between Helsinki and the largest cities. The maximum speed on these railway sections of line is 200 km/h. The projects providing additional track capacity will enable a 25-40 % increase in the number of trains when compared to the existing situation.

The Nordic Triangle railway projects will increase the number of trips by train in the entire country due to improved and faster railway connections. For example, railway connections in the regions of Pori, Oulu, Jyväskylä, Kuopio and Joensuu will be significantly improved.

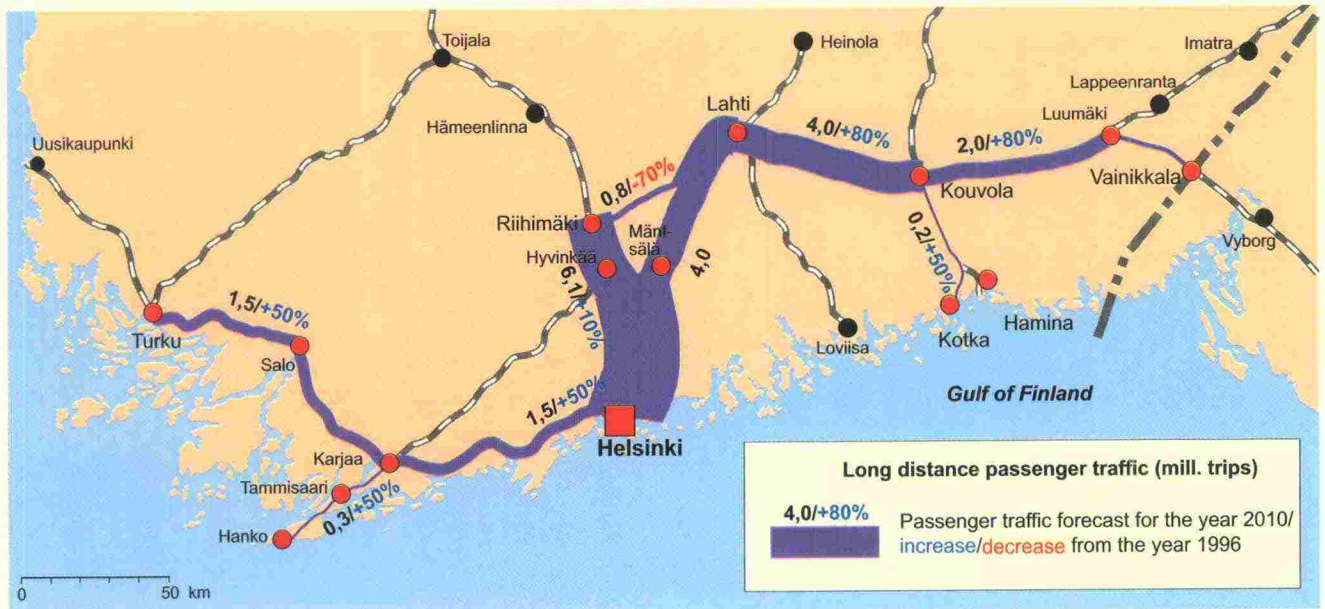
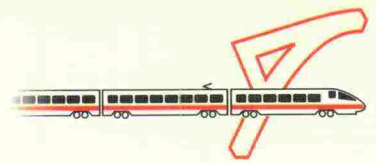
Shorter travel times and increasing number of trains will increase the number of domestic, long-distance train trips by 8-12 % or 4000-6000 trips/day by the year 2010. Most of this growth is the result of passengers shifting from other modes of transport.

The implementation of railway projects and the increasing number of trains will provide for about 240 million FIM annual socio-economic net benefits. A share of almost 70 % of this net benefit consists of passenger travel time savings. Other benefits include smaller number of accidents, lower level of emissions and road deterioration as well as increasing revenues of railway traffic.

International Passenger Traffic

The integration of Finland to the European cooperation will emphasise the significance of international connections. The need for passenger and freight traffic connections has rapidly increased within the Baltic Sea region. The implementation of the Nordic Triangle railway projects will further intensify the Nordic connections and improve the accessibility of Finland to Russia, to the core regions of the Baltic and to continental Europe.

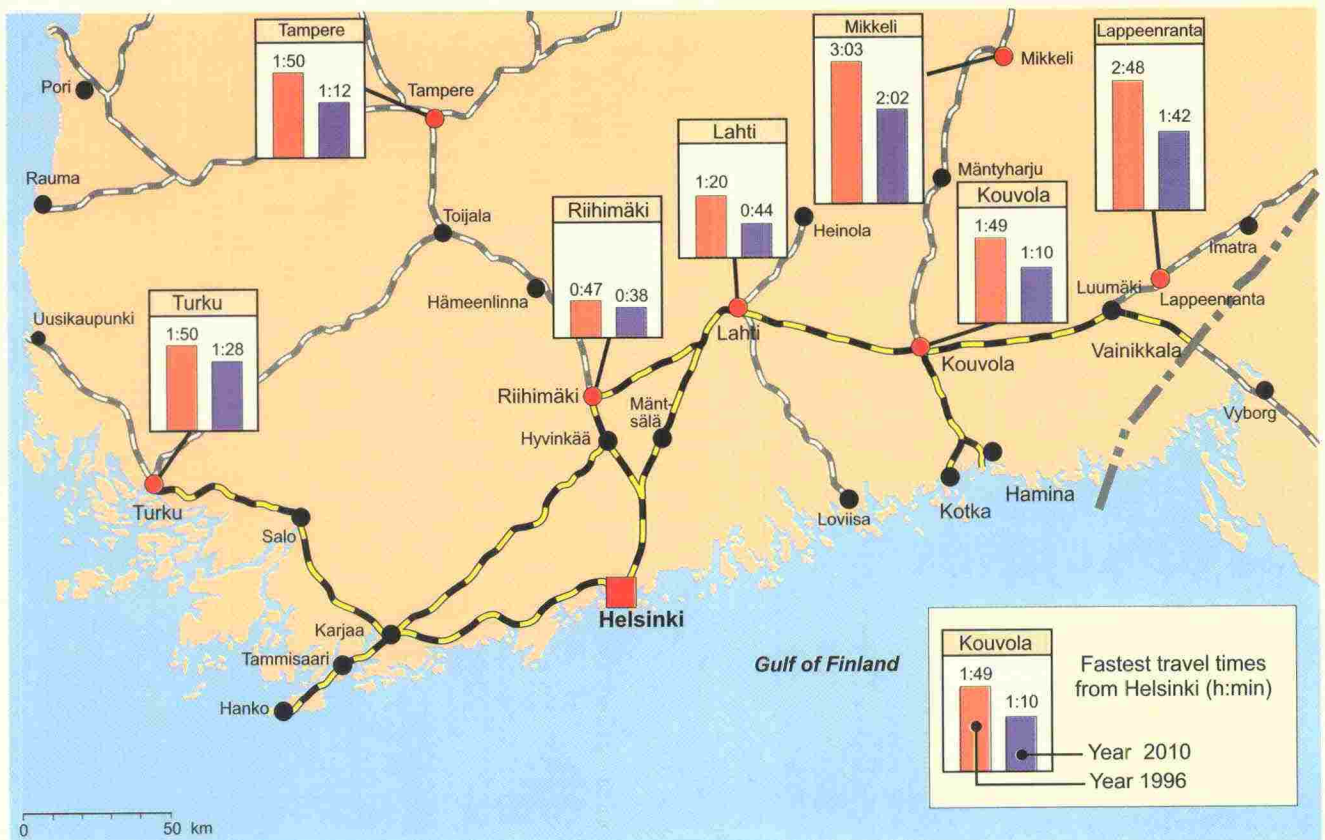
The Nordic Triangle railway connection Turku-Helsinki-Vainikkala is an important international railway route from Finland to Russia. There is regular, international railway passenger traffic from Helsinki to St. Petersburg and Moscow.



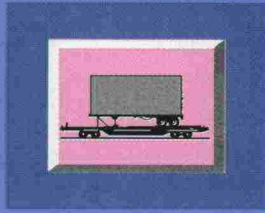
Passenger traffic forecast on the Nordic Triangle railway network for the year 2010 and change from the year 1996

The travel time between Helsinki and St. Petersburg can be reduced from the existing 6 hours to 3 hours by improved railway network and rolling stock as well as through more efficient operations. This will increase the significance of railway traffic in international passenger traffic. For example, the opportunities for making a daily trip from Finland to St. Petersburg will be improved.

The significant reduction in travel time will increase the number of international trips between Finland and Russia, e.g. between Helsinki and St. Petersburg. The annual number of passengers between Finland and St. Petersburg has been estimated to grow from about 100 000 passengers in 1996 even to 500 000 passengers by the year 2010.



Fastest travel times from Helsinki in 1996 and 2010

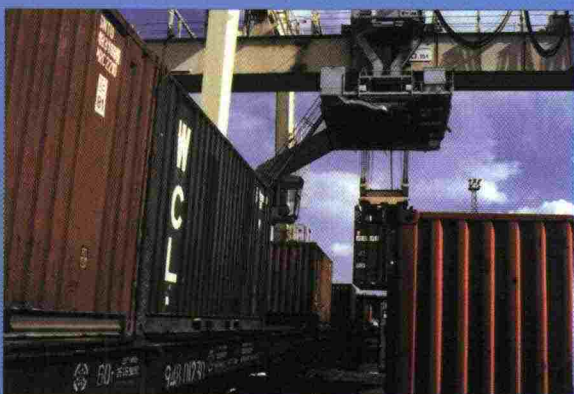


The Nordic Triangle railway network has a significant role in domestic and international freight transports of Finland.

The upgrading and development of railways will improve the smoothness, reliability and safety of freight transports and lower the transport costs of industry.

The development of the sections of line of the Nordic Triangle as well as terminal and port operations will promote the competitiveness of railways.

The Nordic Triangle transport corridor also serves the transit traffic through Finland and provides new possibilities for developing international freight traffic.



FREIGHT TRAFFIC

Impacts on Freight Traffic

About 38 million tonnes of freight was transported on the Finnish railway network in the year 1996. The share of railways in the freight kilometres transported in Finland is about 25 %. According to existing opinion, the tonnage on the railways can be increased to 44-47 million tonnes in the year 2010. Growth potential will especially be found in the traffic to the east.

The railway network of the Nordic Triangle has a central role in the domestic and international freight transports of Finland. The largest railway freight flows occur on the sections of line of the Nordic Triangle. These sections of line constitute more than 25 % of the railway tonne kilometres. The greatest freight load is on the section of line between Kotka/Hamina-Kouvola-Vainikkala.

The upgrading and development of railways will improve the smoothness, reliability and safety of freight transports and lower the transport costs of industry. The development of the sections of line of the Nordic Triangle as well as terminal and port operations will promote the competitiveness of railways.

The upgraded tracks will provide new logistic opportunities for developing international freight transports. There are smooth and rapid customs operations in the freight traffic between Finland and Russia. Export and import traffic will benefit from the additional track capacity and improved transport reliability. In addition, development potential for combined transports will be improved.

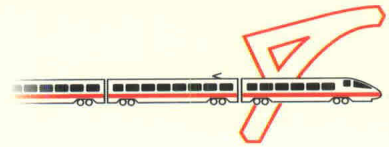
The economic development of Finland, western Europe and Russia as well as the transit traffic volumes will have an impact on the freight traffic volumes in the Nordic Triangle transport corridor.

Transit Railway Traffic

Finland is the only member of the EU sharing a common border with Russia. The Nordic Triangle transport corridor provides opportunities for transit traffic through Finland.

Finland and Russia have the same rail gauge. Thus, most of the transit traffic through Finland is transported by rail. Transit traffic volumes by rail in the Nordic Triangle railway network were about 3 million tonnes in the year 1996.

Major part of the transit traffic by rail is transported from east to west. Raw materials of industry are

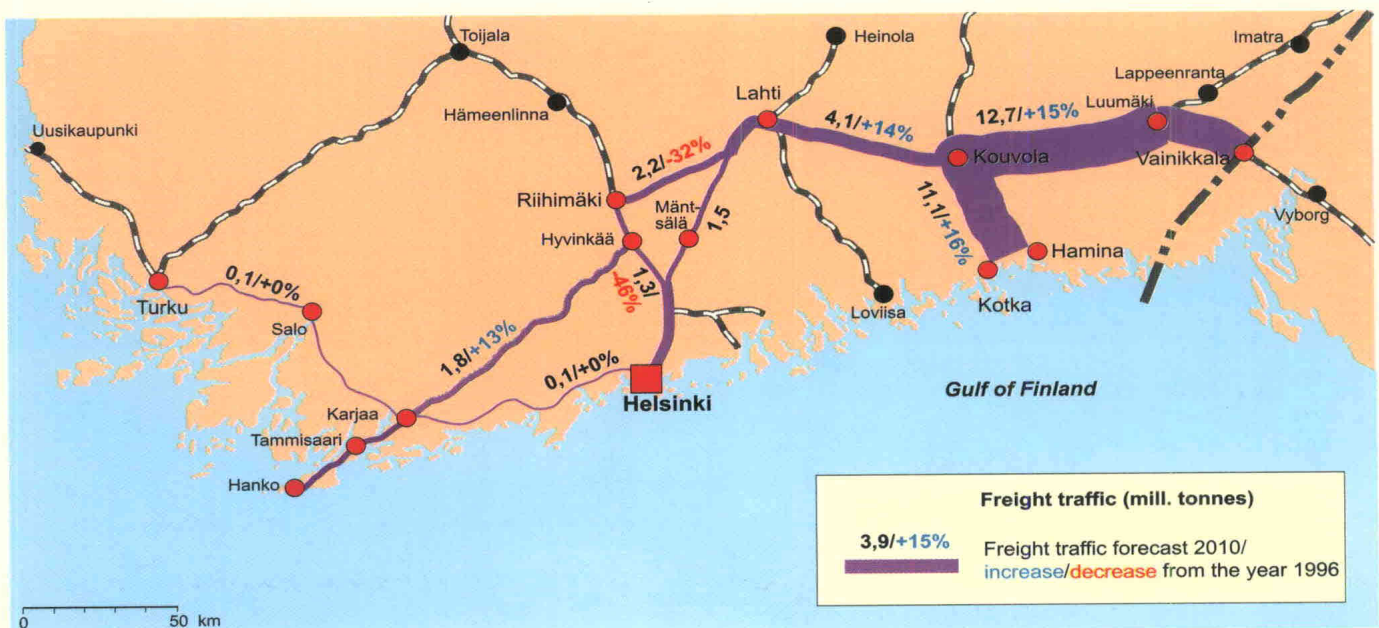


mainly transported from Russia to other parts of Europe, whereas consumer goods, electronics and foodstuffs are imported to Russia. Transports to east - to Russia, the CIS-countries and the Far East - consist mainly of container traffic.

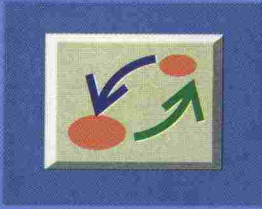
The sections of line of the Nordic Triangle already provide an operational, efficient and safe route for transit traffic. Rapid and smooth transports will further promote the competitiveness of railway traffic.

The promotion of the EU integration and the growing cooperation between the EU and Russia will promote the transit traffic flows between west and east. The economic growth and effective construction in Russia will promote freight transports to Russia.

Transit traffic is directed through the Vainikkala border railway station. Traffic operations across the border will be improved by e.g. adding to the capacity of the railyard. The development of the border station will be supported by the Interreg and Tacis- programmes of the EU.

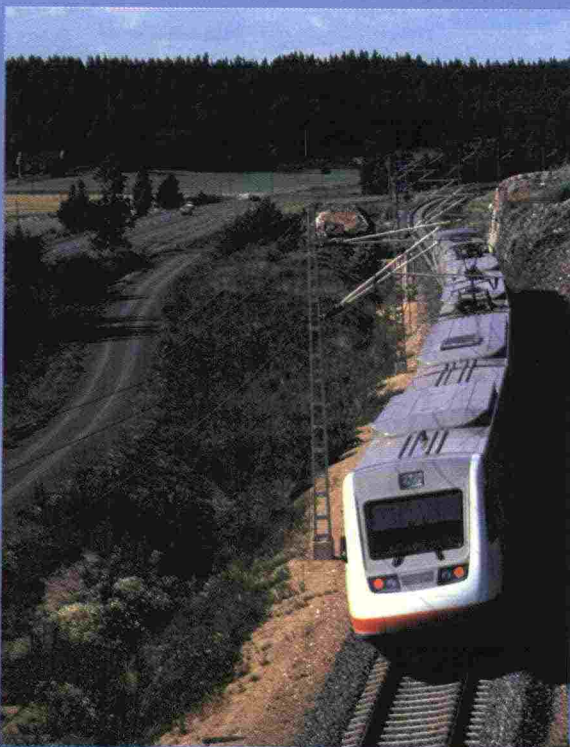


Freight traffic forecast on the Nordic Triangle railway network for the year 2010 and change from the year 1996



The rapid railway connection of the Nordic Triangle Corridor will improve the competitiveness of Finland with regard to passenger and freight traffic. The improved railway connections in passenger traffic will strengthen the gateway position of Finland and bring new tourist resorts within daily railway service.

The Nordic Triangle railway connection will enable the development of specialised production along the rail corridor which is dependent on smooth transport connections. In addition, the commuting areas of international enterprises will extend along the railway corridor and provide for faster business trips which are typical of these enterprises.



IMPACTS ON REGIONAL STRU

Railway Traffic and Community Structure

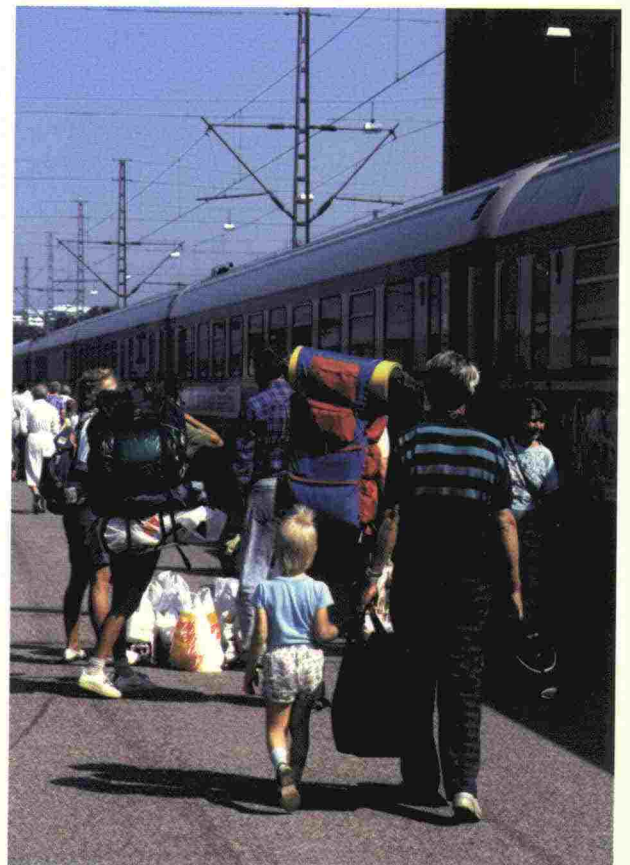
City regions form the basis of the regional structure of Finland in the future. Efficient transport networks connect the city regions to each other within transport corridors.

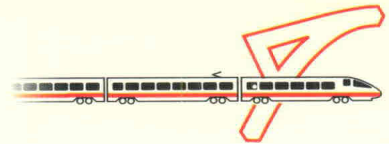
More rapid railway services will have an impact on the regional and community structure along the railway corridors. The greatest benefits of the more rapid railway services will be directed to the station sites. Good feeder connections will extend the impacts to the surrounding areas of stations. In this way, a ribbon-type chain of towns will be formed, the interaction of which will be maintained and promoted by the rapid railway connection.

The magnitude of the impacts will depend on the size of the station site and distance from large city regions. Direct impacts are linked to travel time savings and increasing attraction due to improved accessibility. More rapid connections will extend the growth impacts along the railway corridor.

Railway Tourism Development

Changes in the surrounding areas of Finland, especially in the Baltic region, have had a positive impact on the position of Finland with regard to traffic.





Rapid railway traffic serves travelling between large cities, the connections between southern and northern Finland as well as international tourism from Finland to St. Petersburg and Moscow.

The rapid railway network of the Nordic Triangle will increase the share of train in domestic passenger traffic. Shorter travel times by train will enable longer day trips. The accessibility of the cities in eastern Finland will especially be improved.

Due to the development of the Turku-Helsinki-Vainikkala railway, the international connections to Russia will be accelerated. This will promote the significance of railway traffic in the travelling between east and west. The significance of Helsinki and Turku as gateway stations for ferry-train and airplane-train trip chains will be promoted.

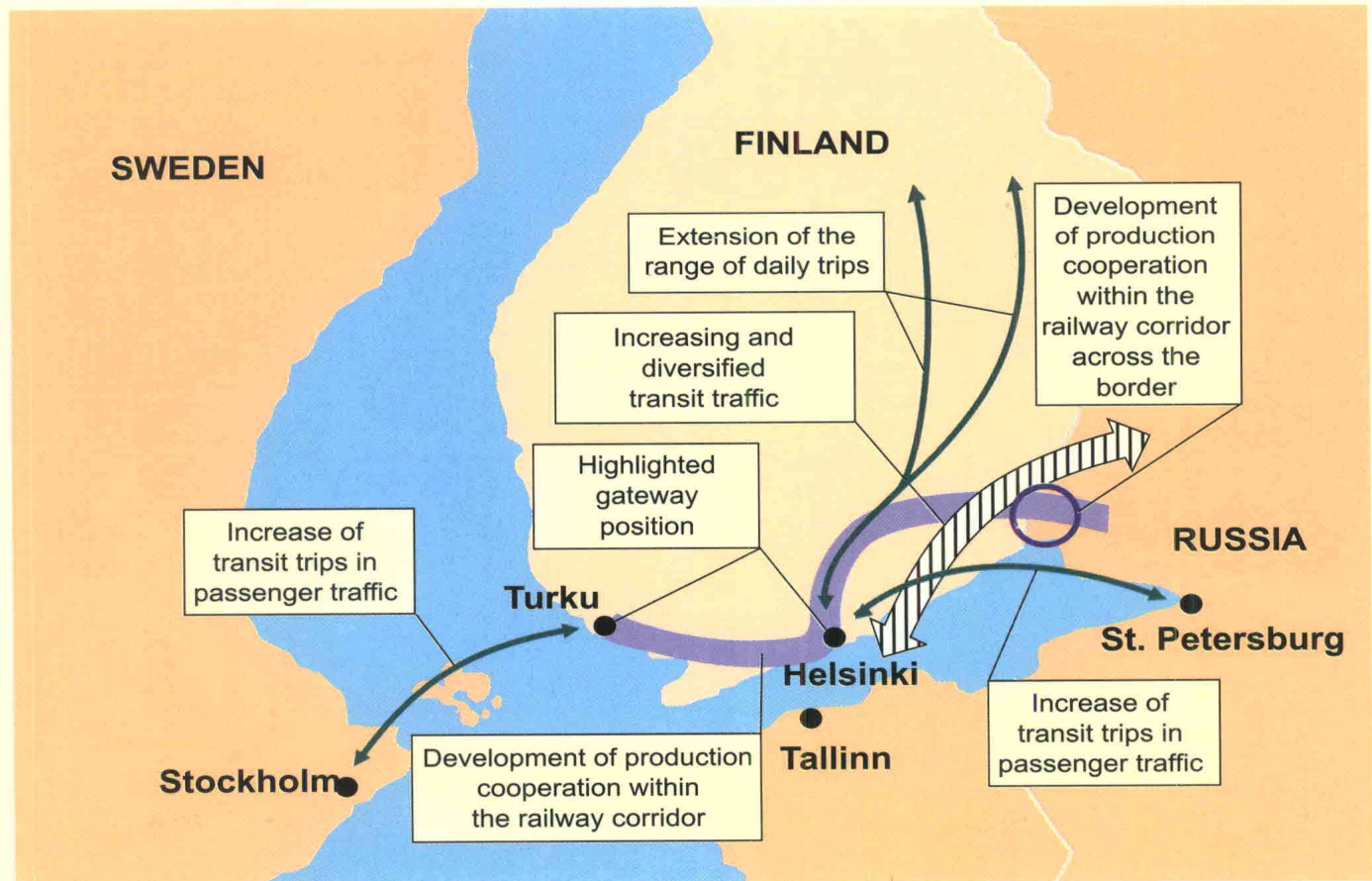
Transport services will be developed so that different modes of transport will supplement each other. This will improve e.g. the operational conditions of railway traffic. For example, travel centres, park & ride systems, transporting cars in trains and harmonised information systems serve railway passengers.

Production Structure and Commuting

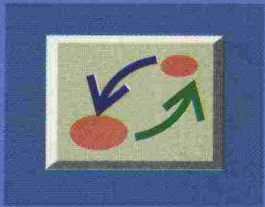
Flexible production systems and network-type structures will become more common at international level. Rapid and reliable transports will promote the location of specialised industry and services within the railway corridor and across the border.

The production cooperation across the eastern border will increase in the future. The integration of the Russian markets and employment to the western know-how and technology will provide pre-conditions for a competitive production centre which is supported by rapid railway connections. Furthermore, cooperation and transports across the eastern border and free warehousing will provide more jobs in the vicinity of the border area.

Rapid connections will also enable faster business trips of experts in the international enterprises operating across the border. The daily commuting areas of these enterprises will extend along the rapid railway corridor.



Impacts of the Nordic Triangle railway corridor on regional structure

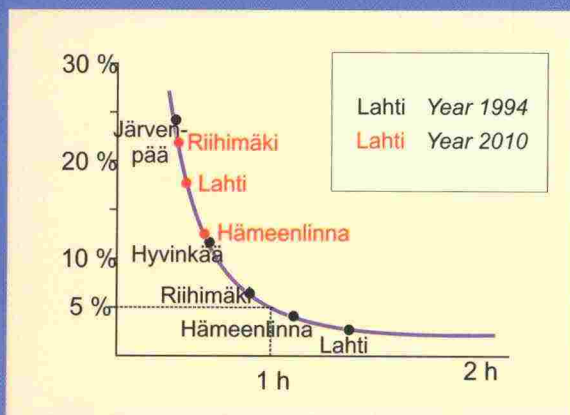


Rapid railway connections promote interaction between station towns and the surrounding areas.

The greatest relative growth in population and the number of jobs will occur in those cities from which, due to the rapid railway connections, the commuters can reach Helsinki within one hour.

The rapid rail connection will shift the regions of Lahti, Karjaa, Salo and Hämeenlinna to the commuting area of Helsinki.

According to the vitality study, the position of the cities having a more remote location off the main transport routes along the railway will be strengthened. The accessibility of these cities will be significantly promoted due to a new commuter train connection or the direct line.



The share of commuters to Helsinki as the function of travel time by train in 1994 and after the implementation of the Nordic Triangle railway projects in 2010

IMPACTS ON COMMUNITY ST

Regional Impacts

The benefits of more rapid railway connections will be primarily allocated to the larger city regions of the Nordic Triangle Railway Corridor and its extension to eastern Finland as well as to international, regional centres and the municipalities of the Helsinki Metropolitan Area. Community structure will become denser and the land value will increase in the immediate vicinity of stations which will change the functional character and efficiency of land use.

The improving accessibility will also be reflected to the direction and intensity of commuter traffic and e.g. the commuting area of Helsinki will extend along the rapid transport corridor. Rapid and smooth transport connections enable more intense cooperation, interaction and specialisation of enterprises. Production structures and organisations will disperse and form network-type structures along the Nordic Triangle rapid transport corridor.

Railway Commuter Traffic

More rapid railway connections and the construction of the direct rail line from Kerava to Lahti will increase the significance of train in commuter traffic. The commuting area of Helsinki will extend especially along the rail corridor of the direct line.

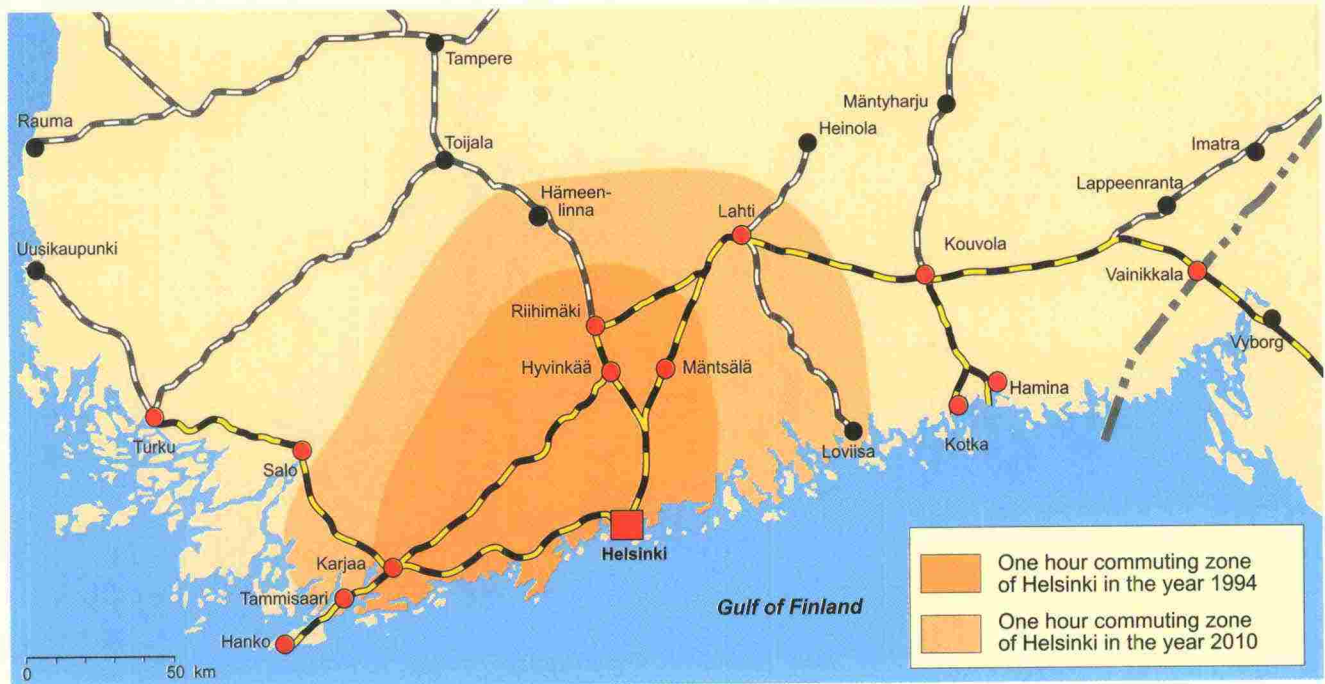
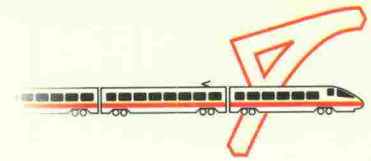
Due to more rapid railway traffic in the Nordic Triangle corridor, the number of daily commuters to Helsinki will increase by about 10 000 persons. The greatest increase will be experienced in the number of commuters from the Lahti and Mäntsälä regions to the Helsinki Metropolitan Area, as travel times from these areas will be significantly decreased due to the new, direct line.

Also, more rapid railway connections to Turku and Tampere directions will significantly increase the number of commuters from the station sites and their impact areas.

Furthermore, daily commuting from other station sites of the Nordic Triangle railway corridor to the cities of Lahti and Kouvola will grow significantly. Especially, commuting from the Lahti and Mikkeli regions to Kouvola will increase. More rapid railway connections will also promote daily commuting from Helsinki to other centres in the railway corridor.

Population Development

The new, direct line from Kerava to Lahti will extend the commuting area of Helsinki to the east and simultaneously create a rapid interaction corridor for



One hour commuting zone of Helsinki in 1994 and 2010

the centres of eastern Finland. The population of Lahti will experience the greatest increase and moderate population growth will occur in the Kouvola and Mäntsälä regions. The new feeder railway service to Mäntsälä will promote the attraction of the region.

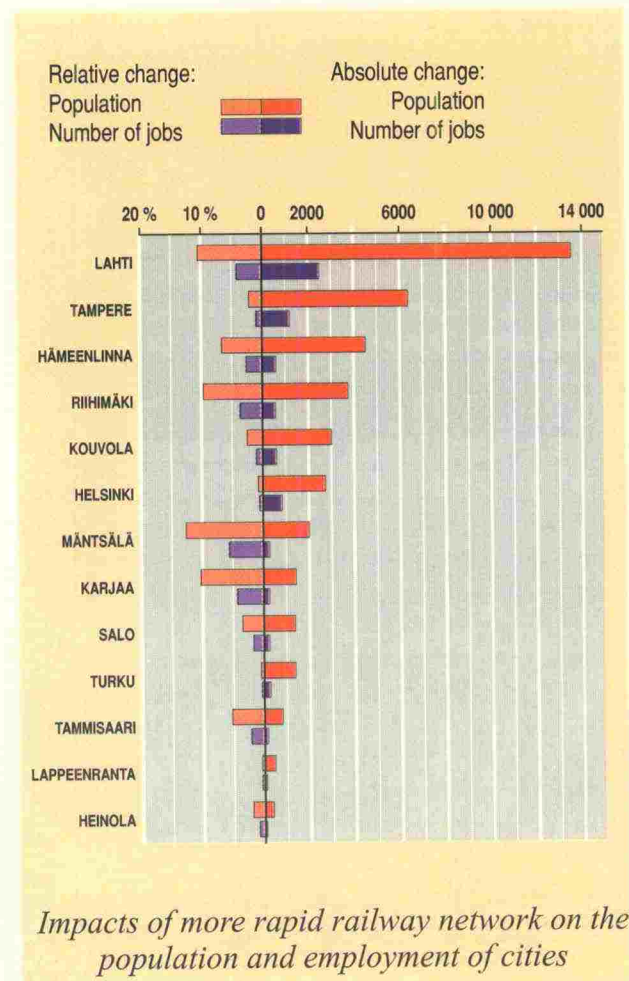
As a result of a multiplier effect of a more rapid railway connection along the main tracks to Tampere and Turku, the relative increase in the population of Riihimäki and Hämeenlinna as well as Karjaa and Tammisaari will be of great significance. Due to rapid railway connections, these centres will strengthen their position and will provide an inexpensive living environment for the commuters to the Helsinki Metropolitan Area.

Employment Development

The number of jobs in the service sector will especially grow within the impact area of railway corridor as a result of a multiplier effect of the increase in the population of station sites and their surrounding areas. Similar to the population growth, the most significant increase in the number of jobs due to more rapid railway connections will occur in Lahti and other stations in the commuting area of Helsinki along these rail lines. Simultaneously the rapid connections will especially support the development and competitiveness of the centres in eastern Finland.

The decrease in travel times along the main track to the north and in the Turku direction will lead to greater number of jobs at the station sites. More rapid

railway connections will have the greatest relative impact on the employment of small and medium-sized centres and the greatest absolute impact on the increase in the number of jobs in the city of Tampere.



Impacts of more rapid railway network on the population and employment of cities

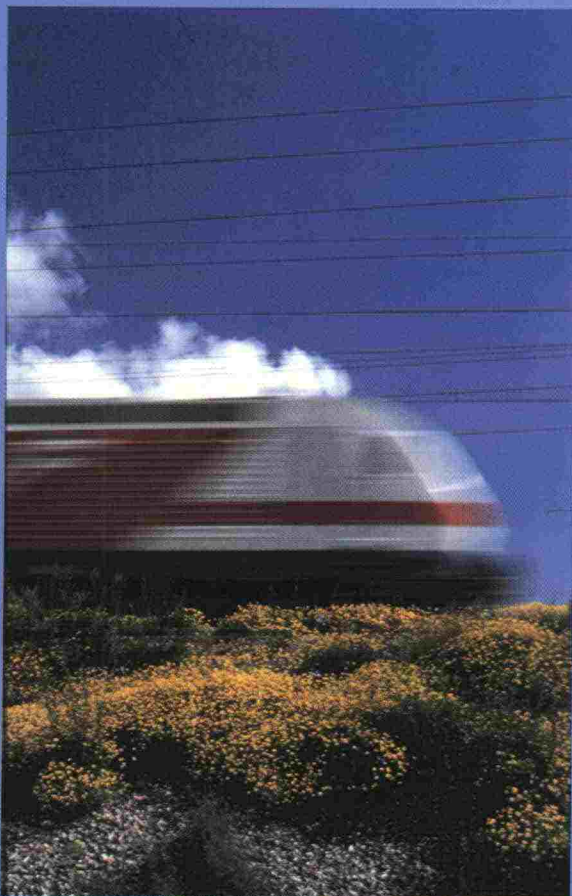


The upgrading and development of the Nordic Triangle railway network will promote the environmental goals of transport.

Improving the competitiveness of railway traffic will reduce the energy consumption and emissions of transport.

The promotion of railway traffic safety will decrease the risk of accidents and environmental hazards.

Environmental aspects will already be considered in the planning phase of railways.



ENVIRONMENTAL IMPACTS

General

The upgrading and development of the Nordic Triangle railway network will promote the environmental goals of transport. The improvement of the level and increasing the speed of railways will promote the competitiveness of railway traffic and increase the modal share of train.

Increasing speed and rail services will lead to increasing energy consumption of railway traffic and thus the emissions of electricity production. However, the total emissions and energy consumption will decrease, as the road traffic volumes decrease.

Changes in the year 2010

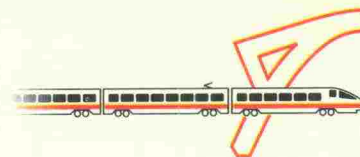
Emissions (t/y)	Railway traffic	Road traffic	Total
NO _x	+24	-311	-287
HC	+2	-60	-58
CO		-351	-351
Particles	+5	-23	-18
Sulphur	+15	-6	9
CO ₂	+22 088	-39 293	-17 205
Energy consumption (GWh/y)	+63	-139	-76

Impacts of the development of railway traffic to the total emissions and energy consumption of long-distance traffic

New, quiet rolling stock and high-level track maintenance will mitigate the noise emissions caused by railway traffic.

Removing of level crossings, automatic train protection and track blocking system will improve traffic safety. This is of special importance on those sections of line where a lot of chemicals and fuels are transported. The promotion of railway traffic safety will decrease the risk of accidents and environmental hazards.

Most of the railway projects will be conducted on the existing tracks and therefore these projects will not cause changes in natural areas or landscape. The environmental impacts will be studied and considered in the planning of new and additional tracks.



Kerava-Lahti direct line

The environmental impacts of the Kerava-Lahti direct line have been minimised by planning the railway for its entire length (62 km) in the immediate vicinity of the Helsinki-Lahti motorway. In this way, the combined impacts of the railway and motorway on the natural areas, landscape and noise will be smaller and their mitigation will be more efficient.

Luumäki-Vainikkala additional track

The planned 21 kilometre additional parallel track leading to the Russian border will be located about one kilometre north of the existing track. The new track will be mostly aligned in remote forests and the residential impacts will be of minor significance.

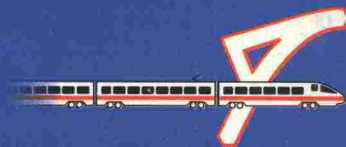
The disadvantages to animals will be alleviated so that most of the underpasses will allow for the animals to cross the track. The new additional track will improve railway traffic safety and thus reduce the risk of accidents in oil and chemical transports.

City railways

The city railways between Helsinki and Leppävaara as well as between Tikkurila and Kerava will promote the park&ride system and more efficient and environmentally friendly transport system. City railways will reduce the total energy consumption and emissions of traffic. Growing railway traffic may locally increase noise emissions, but, on the other hand, it can be mitigated by improving the rolling stock and track.



DEVELOPMENT OF THE NORDIC TRIANGLE RAILWAY NETWORK IN FINLAND



SUMMARY

Nordic Triangle

The EU has identified 14 primary TEN-transport projects. The Nordic Triangle is one of them. The Nordic Triangle is a transport system of different modes which links the capital cities of the Nordic

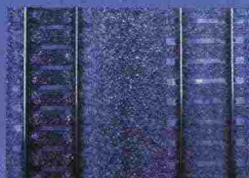
countries with each other and provides connections between the EU and Russia. The Nordic Triangle in Finland is a west-east transport corridor from Turku to the eastern border.



Nordic Triangle Railway Projects in Finland

The Nordic Triangle Railway Projects in Finland consist of five sections of line including Helsinki-Turku, Helsinki-Vainikkala, Kouvola-Kotka/Hamina, Hanko-Hyvinkää and Kerava-Lahti.

The total costs of these projects will be 6,9 billion FIM during the years 1997-2010. A share of 4,8 billion FIM of it will consist of new development projects and 2,1 billion FIM of track upgrading.



Passenger Traffic

The upgrading and development of railway network in the Nordic Triangle will enable the acceleration of passenger traffic and increasing number of trains. It is estimated that the number of domestic, long-distance railway traffic will increase

by an average of 5 000 trips/day by the year 2010. The Nordic Triangle railway corridor is an important international passenger traffic route from Finland to Russia - St. Petersburg and Moscow.



Freight Traffic

The Nordic Triangle railway network has a central role in domestic and international freight transports of Finland. The upgrading and development investments of railways will improve the smoothness,

reliability and safety of freight transports and lower the transport costs of industry. The Nordic Triangle railway corridor also serves the transit traffic through Finland.



Impacts on Regional and Community Structure

The benefits of rapid railway network will be primarily distributed to the larger city regions of the Nordic Triangle railway corridor and to the regional centres of eastern Finland railway corridors as well as to the municipalities of the Helsinki

Metropolitan Area. The new, Kerava-Lahti direct line will extend the commuting area of Helsinki to the east and create a new, rapid transport corridor for the centres in eastern Finland. The greatest impacts will be directed to the Lahti region.



Environmental Impacts

The upgrading and development of the Nordic Triangle railway network will promote the environmental goals of transport. Improving the competitiveness of railway traffic will reduce the energy consumption and emissions of transport.

The promotion of railway traffic safety will decrease the risk of accidents and environmental hazards. The construction of new railways will primarily have local environmental impacts which can be alleviated through alternative measures.



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