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Traffic in Helsinki 2002

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Traffic in Helsinki 2002

There is a wealth of information available about traffic and transport in Helsinki. This publication seeks to compile the latest information and to describe traffic and its significance in a modern networking information society, where efficient, smooth-flowing, safe traffic is growing in importance. Communications and accessibility are becoming increasingly important competitive factors. This special publication, compiled by a range of different experts, provides an overview of how traffic works in Helsinki. Traffic in Helsinki 2002 was published in Finnish at the beginning of the year 2003, and it was prepared in collaboration with Helsinki City Planning Department.

Traffic is an important part of an urban community's function. Helsinki and its surrounding municipalities form Finland's largest labour market area, where traffic is a key development factor. An efficient public transport system is of paramount importance for the everyday convenience of Helsinki inhabitants, whose transport habits are examined by interview surveys. Traffic control systems play a major role in road safety.

Helsinki is a major international hub for both passenger and goods traffic. This publication contains sections on Helsinki's logistical position, traffic and passenger volumes and transportation economics. It also contains an extensive review of the adverse environmental impacts of traffic. Telecommunications, information technology and future prospects are also touched on.

We would like to warmly thank all persons and organisations involved in this publication.

Helsinki, December 2003

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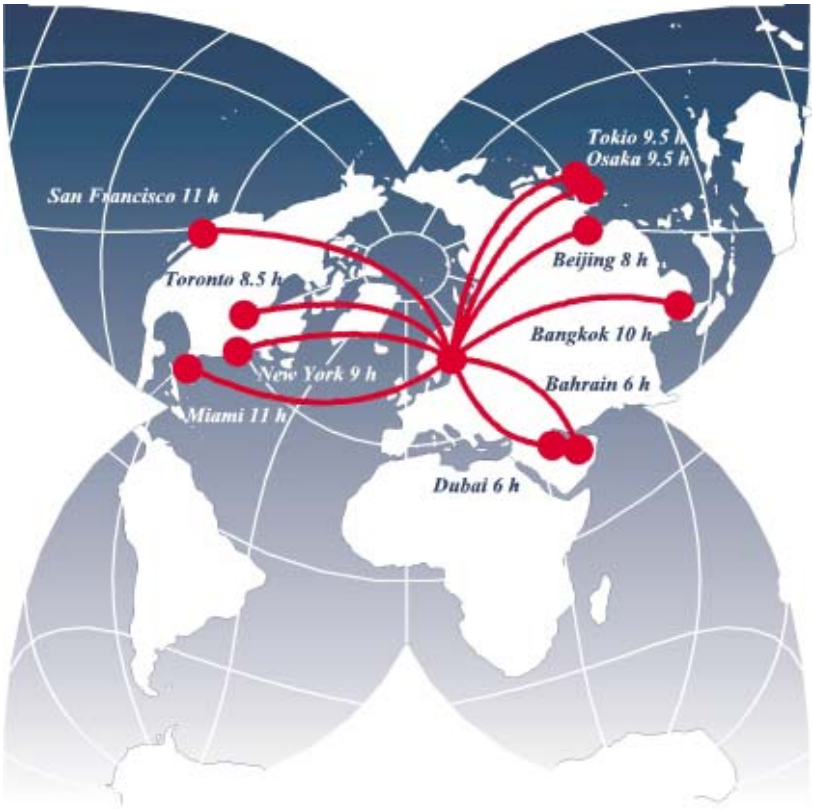
1. Helsinki's traffic-related position

1.1 Europe

Seen from Europe, especially from the area of the European Union, Helsinki is on the periphery. The sea separates it from its main market areas and journeys are long to areas in the heart of Europe and other extreme corners of Europe. Helsinki's position makes air traffic and shipping extremely important.

Map 1.1 Flight times from Helsinki to North America and the Far East.



Source: Helsinki City Planning Department, Civil Aviation Administration, Finnair

As regards air traffic, Helsinki's position has some advantages over the rest of Europe.

Routes to the Far East in particular are shorter via Helsinki. This in turn adds to the supply of routes and thus improves the city's accessibility. Similarly, the airspace is less crowded than in Europe's core areas. In 2000, over 10 million passengers passed through Helsinki-Vantaa Airport.

Most of the flows of goods in Finland's foreign trade go by sea. Since Helsinki and environs constitute Finland's largest consumer region, the main stream of imports flows towards Helsinki. This in turn means frequent, scheduled traffic, which is a major advantage for exports. At the Port of Helsinki, imports and exports are almost in balance. Helsinki is Finland's largest port for unitised cargos and the second largest in the Nordic countries after Gothenburg, Sweden.

Map 1.2 Transit freight by rail from Helsinki, transport times in days in 2002.

Source: Helsinki City Planning Department

Water routes are also important for passenger traffic, with almost three million passengers a year on the ferries plying between Finland and Sweden. Since Estonian independence, there has been a dynamic rise in traffic between Helsinki and Tallinn, with over six million passengers a year.

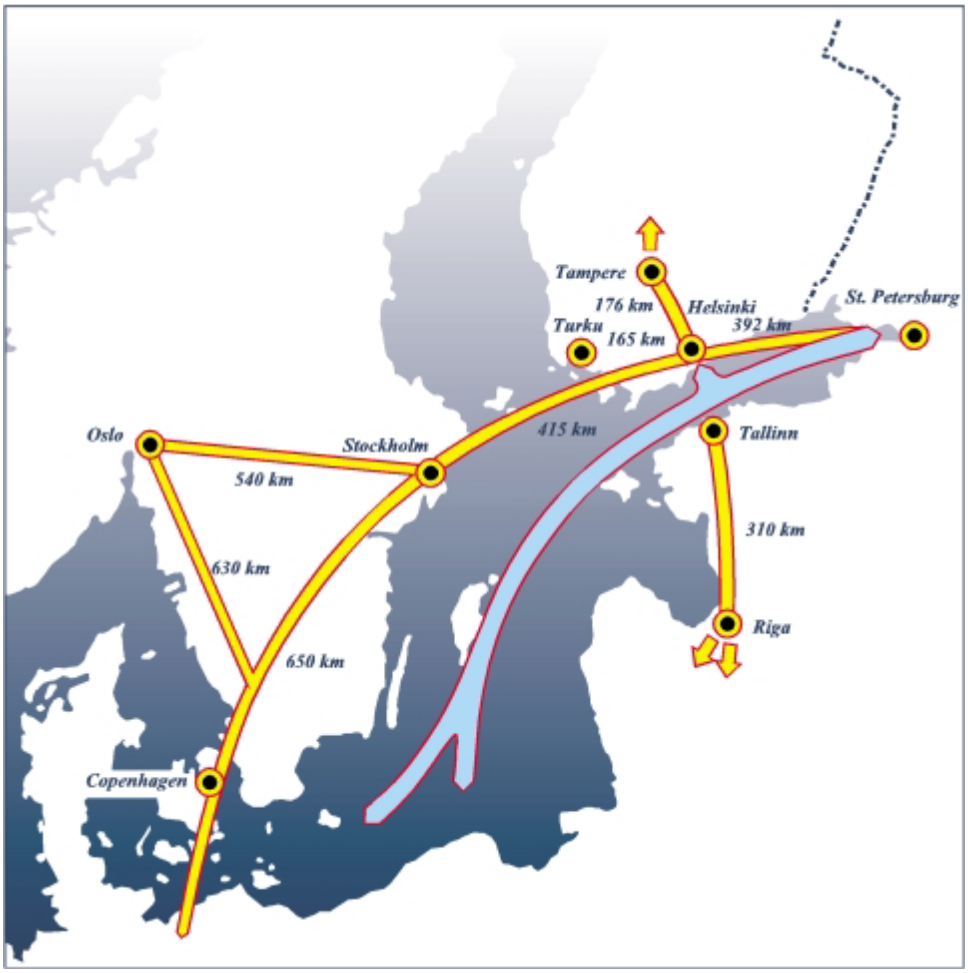
The fall of the Iron Curtain in the early 1990s has otherwise changed Helsinki's traffic-related "position". Not only Tallinn, but also St Petersburg and Riga are nearby and easily accessible.

The opening up of Finland's eastern neighbour highlights the importance of Helsinki's road links. For historic reasons, Finland and Russia share the same railway gauge. Russia is an enormous country and rail traffic has played a major role in the country's development, which explains Russia's extensive rail network. The rail link from Helsinki extends not only to Russia, but also much further afield to Asia Minor, China and the Pacific Coast.

1.2 Finland

Finland is a large, sparsely populated country. Helsinki is on the perimeter of the country, although enjoys a favourable position from the aspect of international communications. Even before Helsinki was founded, major transport routes converged in the area. Construction of Finland's first railway, between Helsinki and Hämeenlinna, and later to St Petersburg, was also a major step. A scheduled rail service was introduced between Helsinki and Hämeenlinna in 1862 and on the Helsinki-Riihimäki-St Petersburg line in 1870.

Map 1.3 Connections from Helsinki to adjacent areas.



Source: Helsinki City Planning Department, The Finnish Road Administration

Recent decades have seen work on building a motorway network. Motorways to Lahti and Tampere have already been completed and work is currently underway on building a Turku-Helsinki-St Petersburg motorway as part of the Trans European Network (TEN), where it has priority status with a further fourteen European projects. Finland's large size also means it has a very advanced domestic air traffic sys-

tem. Domestic flights account for around 30 per cent of traffic at Helsinki-Vantaa Airport. There are especially frequent flights to Oulu, which has developed into a north Finnish metropolis and is home to Finland's second major ICT cluster.

1.3 Helsinki Region

The Helsinki Region forms a semi-circle. Helsinki is on the coast and its centre is on a peninsula. From the transport aspect, this means longer journeys than a similar circular region. Regional population growth is taking place increasingly further away from the centre.

During the early days of motoring in the 1960s, the location of the city centre was considered especially problematical. Nowadays, we understand the environmental values relating to Helsinki's position. What was earlier considered a disadvantage is now thought of as a major benefit.

A centre surrounded by the sea and enjoying a location where ship's passengers sail right into the heart of the city is something quite unique even in an international context.

People come into the centre by public transport and increasingly by rail. Helsinki is improving the transport system by extending and enhancing the rail network.

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2. Transport policy and infrastructure

2.1 Transport policy

Strong population growth in Helsinki and the rest of the Helsinki Metropolitan Area calls for increasingly tougher demands to improve the public transport system throughout the area. When considering the 1992 Master Plan, Helsinki City Council decided that the transport system was to be improved taking into account all forms of transport that support efforts to develop the urban structure and to foster an environment-friendly transport culture. The latter requires no increase in having to rely on a car, as well as an improvement otherwise in public transport journey times and the standard of service in relation to travel by car.

The public transport system is based on improving and expanding rail transport and more feeder transport schemes. Within the inner city, public transport policy is based on retaining and enhancing existing tram network. Transverse (cross-town) public transport is to be improved.

2.2 Transport infrastructure

2.2.1 Road system

There are nine radial arteries entering Helsinki. Five of these are national main roads and four primarily routes serving regional traffic. The radial arteries join the main city road system at a distance of 1-5 km from the city centre.

Two orbital roads link these radial arteries in the Helsinki Metropolitan Area. Ring I is 7-9 km from the city centre and Ring III 13-15 km. There is also a Ring II between these in the west, from Länsiväylä to Turuntie, and there are plans to extend Ring II to the main Hämeenlinnanväylä road.

Streets and roads in Helsinki total 1 127 km.

2.2.2 Light traffic lanes and pedestrian environment

In 1994, the City Council established a target of doubling the amount of cycling in Helsinki. This further integrated cycling into the city's overall transport policy. Efforts to promote cycling have not only included building a network of cycle paths and improving safety, but also cycle parking and even marketing aimed at encouraging cycling.

Helsinki has some 1 000 km of light traffic lanes, of which around 550 km are paved. Approximately one third have separate lanes for cyclists and pedestrians. There are also pavements and many minor pathways through parks that are not part of the cycle path network. Some 20-25 km of new cycle paths are built each year. There are around 280 separate bridges and subways for light traffic, with an average of five new ones being built each year. Half of the cycle paths are next to streets and around half in green areas. There are a total of some 140 km of cycle paths in the inner city and nowadays there are cycle paths through the city from different directions.

A main route plan for outdoor recreation and exercise covers the entire city. The total length of routes is 490 km, of which almost 380 km are in a recreational environment. Some stretches of these routes are shared with other light traffic and some include quiet stretches of street. Most of the routes are illuminated and a considerable part serves as a base for ski trails in winter.

Free city bikes were introduced in Helsinki in 2000, when the city was one of the cultural capitals of Europe. Initially, there were 300 cycles and a further 250 were added in 2001-02.

In practice there are currently about 300 cycles simultaneously in use. Some are being repaired and others have disappeared. The cycles may be used as far as Hakaniemi and Taka-Töölö, which covers a slightly wider area than the city centre. The cycles have proved extremely popular with Helsinki inhabitants and tourists alike. Helsinki City Transport is responsible for the cycles.

A regional recreation map has been the most significant way of marketing cycling. The map started out in 1975 as a cycle path map of Helsinki. There are also 21 different local cycle path brochures in the Helsinki area aimed at introducing local inhabitants to the sights and history along the routes. Each year in May, Helsinki celebrates national cycling week and for a couple of years has also held a regional banderol campaign to entice motorists to leave their cars at home and cycle. Additionally, various offices and departments have more than 600 cycles for various job-related purposes. Since the early 1990s, there has been a tremendous improvement in the pedestrian environment in the city centre. This has been created by allocating more space to pedestrian use and by improving pavement quality through the use of granite slabs and under pavement heating.

2.2.3 Parking areas and number of parking spaces

Helsinki regulates the number of parking spaces, especially in the inner city, in line with its traffic policy. The city's responsibility for parking arrangements is mostly to provide public parking areas.

Because of the huge number of jobs and services in the inner city, especially in the central business district (CBD), there is a very great need for parking spaces. However, in compliance with the city's policies, there are a very limited number of parking spaces available. There can be no significant increase in commuter parking spaces without considerably more congestion. Most of the inner city was built at a time when today's huge parking need could not have been envisaged. However, most of the streets are wide enough for parking. Three in five inhabitants keep their car parked on the street or in some other public parking area.

Parking problems are most acute in the city centre, which has 36 500 parking spaces, some 45 per cent, 16 400, of these are on streets. Just over half of these places, approximately 8 800, come under residential or business parking schemes. Places in parking facilities account for around 11 per cent, or some 4 000 of the total number of spaces. In future, there are plans to reduce the number of street parking spaces and increase the number of spaces in parking facilities. The overall number of parking spaces will remain more or less unchanged.

2.2.4 Goods traffic system

As the centre of Finland's economy and its largest population cluster, the Helsinki Metropolitan Area is a consumer centre and a major commodities production area.

The following facts portray the area's own logistics system:

– a large volume of goods moving within the urban structure
– harbours scattered within the urban structure
– transport services in core areas.

The features below distinguish goods traffic in the Helsinki Metropolitan Area from that in the rest of the country:

– a complete lack of basic heavy industry
– most of the warehouses of central firms and wholesalers are outside the centre
– the Port of Helsinki is Finland's largest port for unitised cargo
– Helsinki-Vantaa Airport is the hub for air cargo in Finland
– the country's largest population cluster requires many delivery operations
– major nationwide transportation of raw materials for the wood and metal industries bypass the Helsinki Metropolitan Area
– relatively more transport within the area than elsewhere in Finland.

2.2.5 Shipping, rail and air traffic

Harbour areas

The Port of Helsinki has four harbours: the South Harbour, West Harbour, Sörnäinen Harbour and Laajasalo Oil Harbour. The West Harbour is the centre of Finland's container traffic. Sörnäinen Harbour is a roll-on/roll-off harbour and an important harbour for vehicle imports. The former shipyard area at Vuosaari has been used as a har-

bour for coal imports. The South Harbour and, to a certain extent, the West harbour are passenger harbours. The most significant project currently under way is Vuosaari Harbour, which will take over all goods traffic from the West Harbour and Sörnäinen Harbour. Passenger traffic facilities will remain at the South Harbour and West Harbour. The port area is 217 hectares and has 8.6 km of quays.

Railway stations

There are 15 railway stations in Helsinki. The largest of these are the Central railway station and Pasila.

Airports

Helsinki-Vantaa Airport recently celebrated its 50th anniversary and is a major base for international air traffic in Europe. The airport also plays an important role as Finland's main airport, with almost all domestic flights either starting or terminating at Helsinki-Vantaa. Some 10 million passengers pass through Helsinki-Vantaa Airport, which provides some 10 000 jobs. A third runway was opened on 28 November 2002.

Helsinki-Malmi, Helsinki's original airport, opened in 1936. With the transfer of scheduled air traffic to Helsinki-Vantaa in 1953, Malmi Airport remained in use for general aviation. This well-equipped airport is home to a host of companies providing flight training and aircraft hire, air taxi companies, helicopter operators and Finland's largest parachute club. The Frontier Guard's patrol aircraft fleet is also stationed at Malmi.

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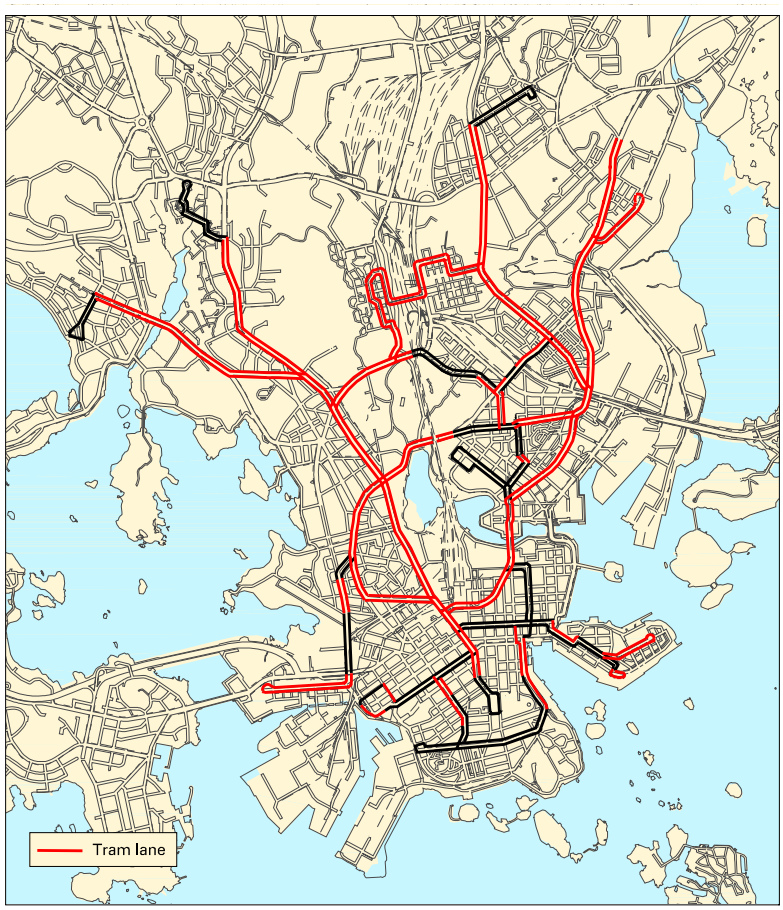
3. Traffic control system

3.1 Bus and tram lanes

Work on the systematic development of public transport schemes in Helsinki got under way with a public transport pilot test in the Helsinki Metropolitan Area in the early 1970s. Road traffic legislation introduced road signs indicating bus and tram lanes in 1972. Even before then, buses had their own lanes with preferential and pre-selection signs and trams had their own lanes with barrier lines and structural segregation.

Map 3.1 Tram lanes indicated by traffic markings or structures in 2002.



Source: Helsinki City Transport HKL

Lane marking aims at equality between public and private transport by dividing existing lanes used in relation to numbers of persons carried by mode of transport. Tram lanes are always in force and reserved exclusively for trams. Bus lanes are normally in force between 7am and 6pm, Monday to Friday and 9am to 3pm on Saturdays. They may also be used by taxis, lorries and vans between 9am and 3pm. Bus lanes total 48.2 km and lanes reserved for trams - either by street markings or structural means – 53.5 km.

3.2 Priority and give way arrangements

Already in the 1930s, traffic routes intended for through traffic were declared as main roads, which meant that traffic on them had priority over traffic joining them from side streets. The late 1970s saw work on harmonising and improving the priority system so that roads of a lower classification also became subject to give-way arrangements.

Priority arrangements sought to improve road safety by simplifying the traffic environment so that give-way signs and what motorists felt to be the right of priority corresponded to each other.

3.3 Speed limits

Helsinki introduced a general speed limit of 50 kph in 1936. However, on some stretches of main country roads, the speed limit was 70 km/h. Even in the late 1970s, over 90 per cent of the road system was subject to a general speed limit. On 19 April 1982, the City Board decided to revise the speed limits along main streets. On 22 September 1986 it decided on a 40 km/h limit on residential streets in suburban areas with a predominance of blocks of flats, on 29 October 1990 on a 30 km/h limit on residential streets in suburban areas with a predominance of small houses and on 16 December 1991 on a 40 km/h limit within the inner city. To reduce speeds to the required level, some 600 traffic calmers have been built: 470 speed humps and 120 raised pedestrian crossings. The remainder are raised junctions and stretches of street. Most of the 1127 km of streets are subject to a 40 km/h speed limit, 12 km are subject to a 100 km/h limit, 37 km to an 80 km/h limit, 11 km to a 70 km/h limit, 52 km to a 60 km/h limit and 161 km to a 50 km/h limit.

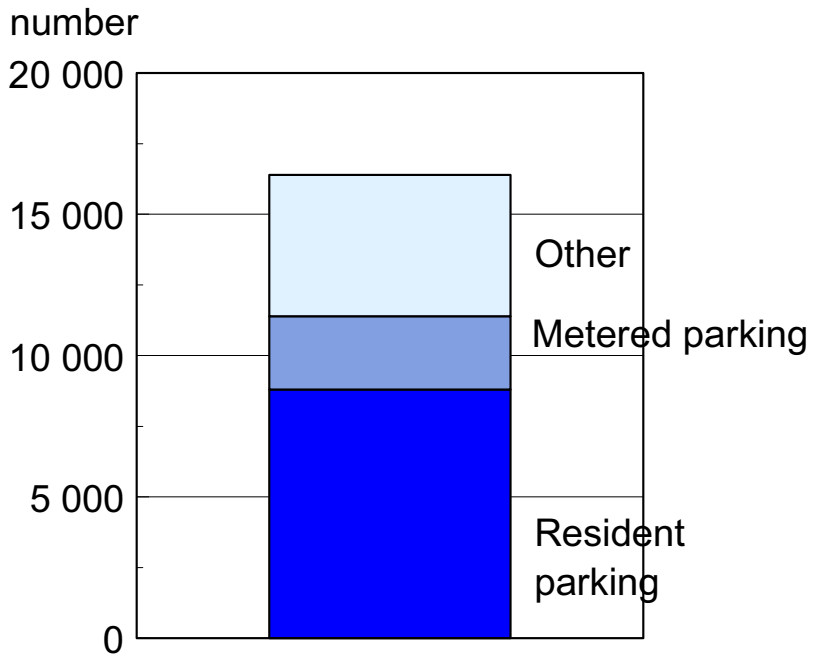
3.4 Street parking

Street parking spaces in the inner city are reserved for three user groups with the following priority:

- Service and delivery traffic
- Inhabitants, near residential blocks
- People transacting business, shoppers and visitors in the proximity of shops, offices, etc.

There are some 16 400 street parking spaces in the city centre. Most of the parking places are subject to a charge.

Figure 3.1 Parking spaces in the city centre in 2001.

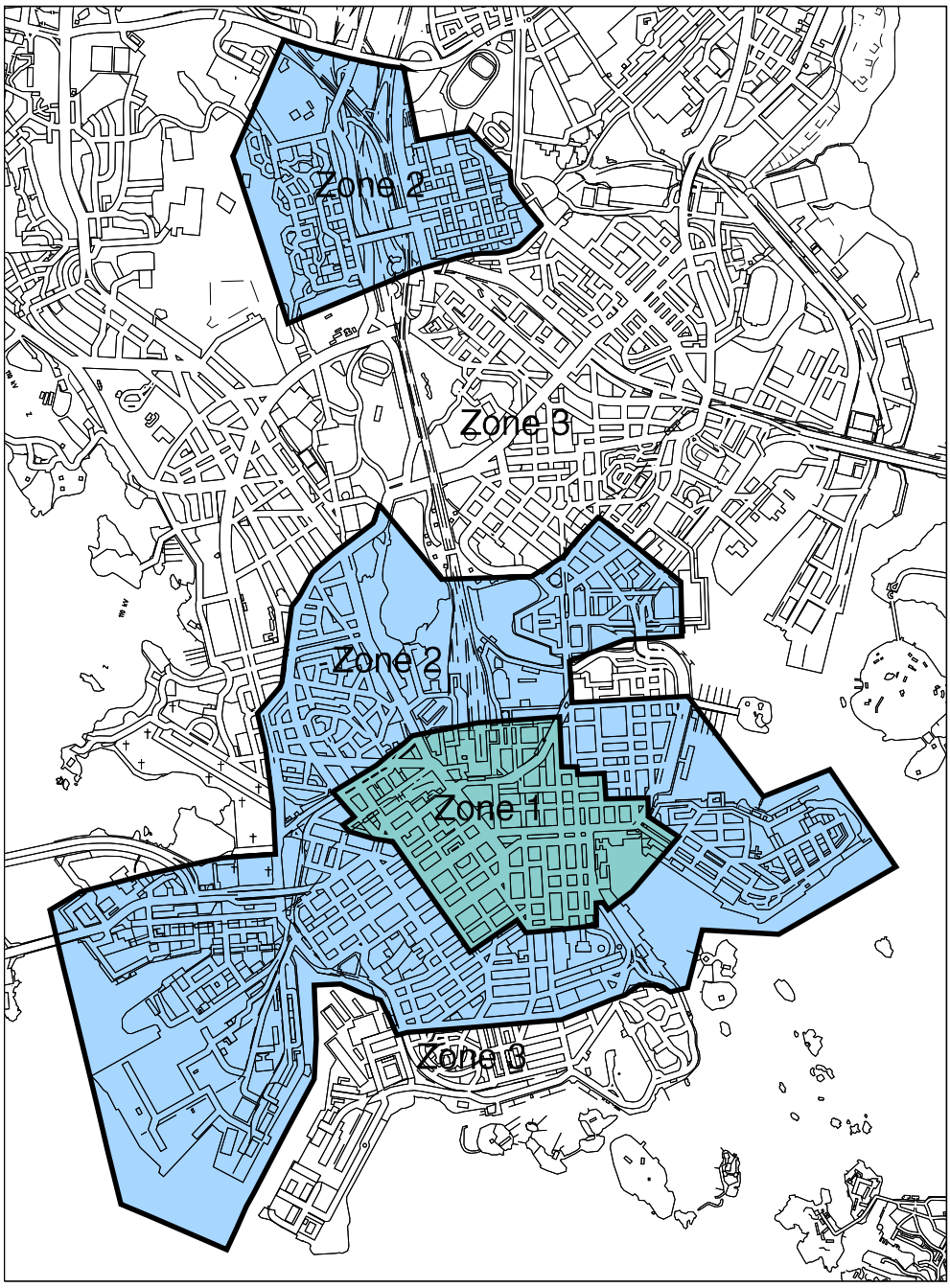


Source: Helsinki City Planning Department.

3.4.1 Car parking charges

The first parking meters were introduced in Helsinki on 2nd May 1955 and allowed payment for a maximum of two hours' parking at a time in 15- or 30-minute periods. The charge was € 0,07 an hour.

Map 3.2 Parking charge zones in Helsinki in 2002.



Source: Helsinki City Planning Department

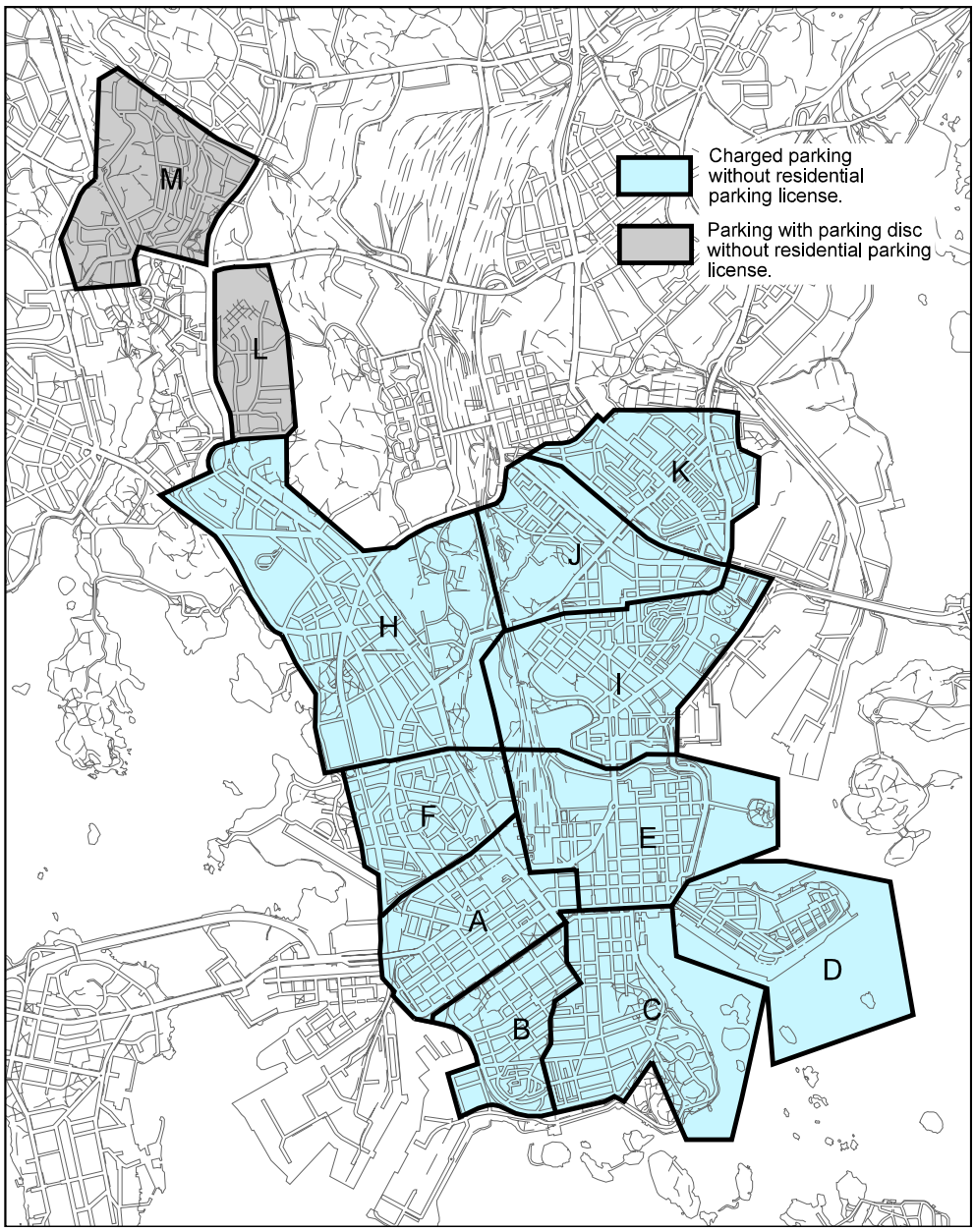
For the purpose of car parking charges, Helsinki is divided into three zones. In zone 1, parking is subject to payment 9am-7pm, Monday to Friday and 9am-6pm on Saturday and in zones 2 and 3, 9am-7pm, Monday to Friday, except for a few separate areas. Parking charges are €2.40 an hour in zone 1, €1.20 an hour in zone 2 and €0.60 and hour in zone 3.

Parking charges can be paid in cash at 427 ticket vending machines and 100 parking meters, by disposable prepaid parking tickets, electronic parking payment device (25 000 in use) or by mobile phone.

3.4.2 Residential and business parking

Helsinki is divided into 12 areas for the purposes of residential and business parking. In nine of these areas parking is subject to a charge except for holders of residential and business parking permits. Residents can buy a parking permit for €36. Business parking permits are available for €360 and entitle holders to park also in residential parking areas. The permits are valid for 12 months at a time. Around 23 500 residential parking permits and 2 800 business parking permits have been issued. There are some 17 000 residential parking spaces.

Map 3.3 Residential parking areas in Helsinki in 2002.



Source: Helsinki City Planning Department

3.4.3 Park & ride

Park & ride parking places are being built in a bid to reduce parking needs in the city centre. Most of the parking facilities are at metro and railway stations. There are currently around 3 000 park & ride parking spaces in use.

3.5 Signs

3.5.1 Traffic signs

Traffic signs aim at complementing the use of maps, street names and address numbers to enable drivers to find their way from main roads to various districts within the city and to the city centre. As a rule, road numbers are generally used on routes out of the city centre. The use of traffic signs in Helsinki is based on an early-1990s general plan covering the entire city. The routes, intersections, places shown and way of giving information were decided at the same time.

3.5.2 Light traffic signs

Light traffic signs are based on signs to a distant destination complemented by various local and special destinations en route. The system was devised in the mid-1980s and in 2000 work began on more extensive plans for light traffic signs. These plans for the entire city are scheduled for completion in 2005.

3.5.3 Road markings

Road markings assist traffic control implemented by structures and traffic signs. Recent years have seen an increase in road markings both in terms of quantity and the introduction of new markings, such as the loading square, which is currently being piloted.

3.6 Traffic control system and miscellaneous traffic telematics in Helsinki

3.6.1 Background and aims

There are many reasons for planning and maintaining traffic signal control. Apart from in rush hour peaks, the use of traffic signals without exception causes delays to main road traffic, but increases safety and cuts waiting times for side street traffic and pedestrians crossing a main road. A rolling horizon giving the green light for private vehicles often puts tram and bus traffic completely on stop.

3.6.2 Traffic control system

The traffic control system is currently divided in two parts. Traffic signal computers control the computer hardware or control devices at junctions. These devices in turn regulate the traffic signals showing red, amber and green for motorists and pedestrians. In the suburbs, traffic signals usually operate independently or are linked up in systems covering 4-8 junctions. Almost all traffic signals today operate in real-time. The traffic signal control device at a junction or individual pedestrian crossing uses sensors and pedestrian buttons to monitor traffic in different directions and constantly regulates the duration of the green light between various directions depending on traffic flow in each direction. The control device can also skip directions or pedestrian crossings when there is no traffic and use the extra green light to benefit other directions and crossings. When the control device receives notice of an approaching tram or bus, it can also effect priority, in other words regulate traffic signals to favour public transport more than normal.

3.6.3 Software

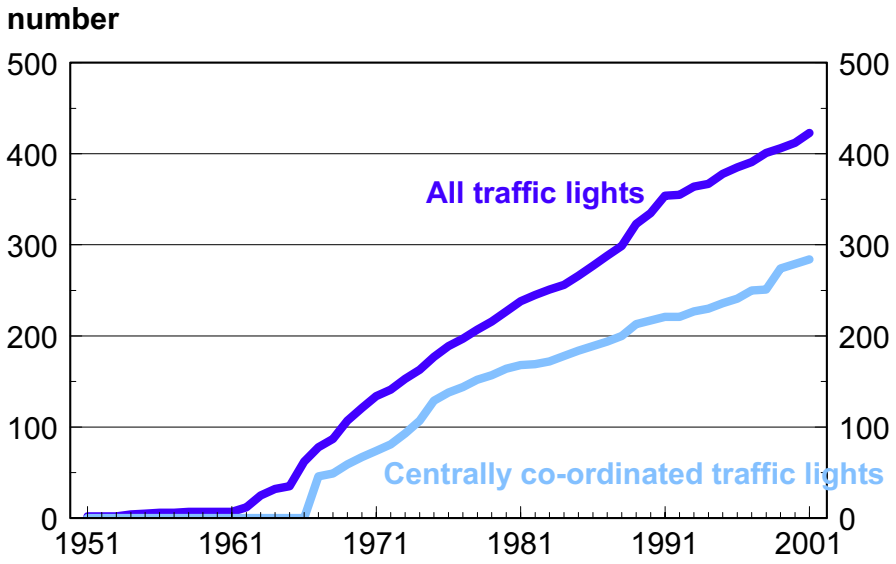
Central computers controlling traffic signals synchronise the traffic signals at different junctions. This means they can create a rolling horizon of green lights from one junction to the next, where traffic can drive, in fact only in one direction at a time, with minimum stops. Central computers select suitable traffic signal programs for different traffic conditions. Most junctions use 8-16 programs. Different traffic signal programs are required, for example, in exceptional traffic conditions such as road accidents or slippery roads.

When major public events are held, traffic signals at the ice rink, Finlandia Hall and the Fair Centre, for example, are almost without exception operated manually by choosing a suitable traffic signal program both before and after the event. This enables smooth traffic flow and limits the extent of any traffic disruptions caused by the event. The traffic control centre also publishes daily, in advance, on its website at www. hel.fi/liikenteenohjaus any events that it expects will affect traffic flow.

3.6.4 Number of traffic signals in Helsinki

The first traffic signals in Helsinki were introduced in 1951 at the junction of Aleksanterinkatu and Mikonkatu streets.

Figure 3.2 Number of traffic signals in Helsinki 1951-2001



Source: Helsinki City Planning Department

It was not until the 1960s and growth of private motoring that the number of traffic signals began to grow. A traffic control centre, then known as the central control for traffic signals, was established in 1967. This also saw Helsinki become one of the first cities in Europe to have computerised traffic signal control. A few years later, most of the traffic signals in the city centre were linked up to the centre.

It was not until the late 1990s that the growth of traffic signals began to level off. Instead of traffic signals at junctions, many new push button operated lights at pedestrian crossings have been built on routes children use to go to school.

3.6.5 Construction of traffic signals in Helsinki

The focus in construction is gradually shifting to traffic signal replacement and maintenance. The oldest traffic control devices date from the early 1970s and are not computerised. All special traffic signal functions such as priority for public transport call for computer operated traffic signal control devices. Because the expected economic lifespan for traffic signal control devices is around 20 years, 15-20 devices have to be replaced each year.

Table 3.1 Helsinki traffic signals in figures in 2002.

Number of traffic lights	
Computer-operated traffic lights	284
Other co-ordinated traffic lights	30
Non-co-ordinated traffic lights	235
Traffic lights total	549
Types of traffic lights	
Traffic lights in intersections	325
Separate zebra crossing lights	89
Tram traffic lights	5
Traffic lights for transversal Joker Bus	1
Fire station traffic lights	2
Tram warning lights	12
Pedestrian warning lights	3
Traffic light equipment	
Traffic light posts	3 756
Traffic light signs	8 176
Traffic light lamps	20 872
Indicators	5 070
Pedestrian buttons	1 111
Traffic light buzzers or similar	573
Public transport priority at traffic lights	
Tram priorities in intersections	106
Tram priorities - coming	258
Bus priorities in intersections	21
Bus priorities - coming	38

Source: Helsinki City Planning Department

3.7 Miscellaneous traffic telematics

3.7.1 Traffic cameras

The traffic control centre operates almost 30 traffic cameras to monitor traffic flow at all strategic junctions. Since these cameras can be turned to different angles and zoomed, they are extremely useful in situations of disruption.

3.7.2 Public transport priority

Public transport priority at traffic signals in Helsinki is part of Helmi, a more extensive telematics system, which features four important public transport functions:

- satellite positioning of buses and trams
- traffic signal priority at intersections
- passenger information
- timetable monitoring.

Satellite positioning is based on GPS hardware in buses and tramcars. The positioning information given by the hardware is synchronised by opening the door at a stop. A precision odometer is used to determine the position of trams and buses between stops.

Traffic signal priority is based on a radio message transmitted by buses and trams at a junction. The place from where the radio modem transmits a request to initiate priority before a junction and immediately after to end priority is programmed into the computer aboard the bus or tram. The impact of the request on traffic signal function depends on the moment in the signal cycle that the control device receives the request: public transport priority is usually in the form of an extended green light, green light acceleration, cycle speed acceleration and extra phase.

Timetable monitoring is based on comparing the scheduled position of a tram or bus to its actual position. The information is continually shown on the monitor in front of the driver to within an accuracy of one second, for example “52 sec late”. Buses and trams running early are not given priority at traffic signals.

The terminal display at bus and tram stops tells when the next bus or tram will arrive. In future this information will also be available by mobile phone or via the internet.

3.7.3 Real-time parking information

There are three real-time parking information systems in Helsinki: Centre, Ruoholahti and Pasila. There are more than 7 000 parking spaces in 12 parking facilities. Real-time parking information aims at telling drivers the parking facilities where there is still space available as the driver approaches them. The information is updated once a minute. The type of information board in use in Helsinki shows the parking situation in the nearest facilities by name and the collective situation in facilities further afield. The real-time information system complements fixed signs and includes 56 information boards which contain 86 individual variable guides. There are 45 fixed signs.

3.7.4 Tunnel control

The latest traffic telematics system is tunnel control of the public transport tunnel on Eliel Saarisentie road. The system comprises changing information boards, traffic signs and signals that can be used to close the tunnel in full or in part from traffic because of maintenance work. All functions can be started automatically from the workstation at the traffic control centre. Tunnel traffic volume and vehicle speeds can also be measured at the workstation.

The system also includes four traffic cameras, which can be used to monitor traffic in the tunnel, and various technical monitoring systems such as ventilation and lighting measurement and regulation systems and emissions monitoring.

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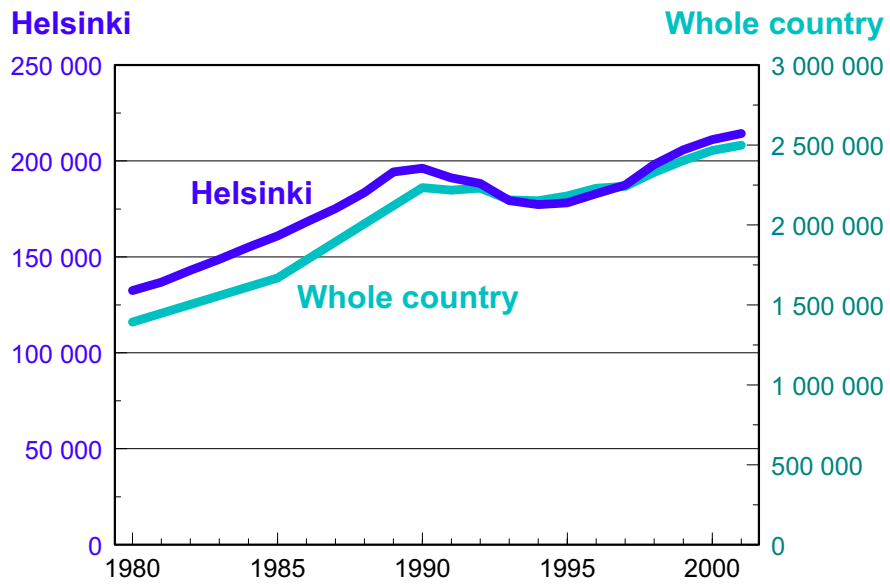
4. Vehicle stock

4.1 Vehicle stock registered in Helsinki

Vehicles include motor vehicles (cars, motorcycles and mopeds), various machinery and bicycles. Vehicle stock means the number of registered vehicles at year-end.

Figure 4.1 Number of vehicles registered in Helsinki and in Finland as a whole 1980-2002.



Source: Finnish Vehicle Administration AKE

At year-end 2001, there were 214 000 vehicles registered in Helsinki, with cars accounting for just under 188 000 of this figure. There were almost 24 000 goods vehicles, around 1 600 buses and almost 1 000 special vehicles, which includes campers and museum vehicles.

4.2 Vehicle trends

The 1980s was a period of great motorisation in Finland, with the vehicle stock in Helsinki rising by almost 50 per cent. During the following decade, the economic situation of the 1990s was reflected in vehicle numbers. Compared to 1990, there are almost 10 per cent more vehicles in Helsinki and the number of vehicles has risen by over 50 per cent since 1980.

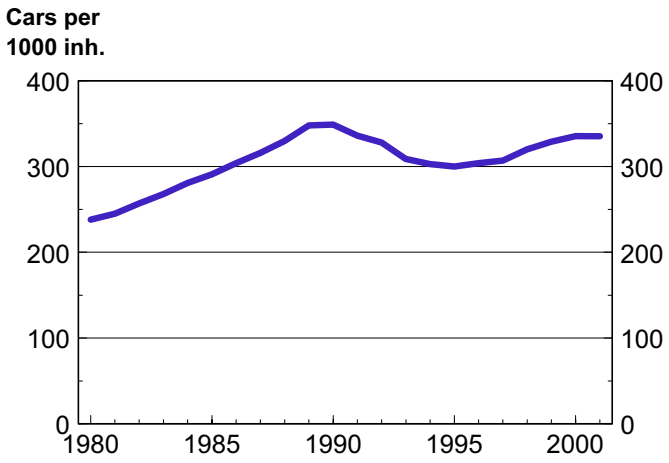
At year-end 2001, there were almost 2.5 million vehicles registered in the country as a whole. Passenger cars accounted for 86 per cent of this figure. The vehicle stock in Finland as a whole has risen slightly more than in Helsinki, especially during the 1980s. In the 1990s, economic cycles affected the vehicle stock in Helsinki much more than in Finland as a whole because the registered vehicle stock in Helsinki contains a higher number of company vehicles than average.

4.3 Car ownership

Car ownership, or the number of registered vehicles per 1 000 inhabitants, was 335 in Helsinki at year-end 2001. The overall number of vehicles registered in Helsinki was 382 per 1 000 inhabitants.

To a certain extent, the change in car ownership in the 1990s differed from the change in the vehicle stock as a whole. After the recession, car ownership grew more slowly in Helsinki than the overall vehicle stock. The ratio of registered cars to the population is still 4 per cent less than in 1990. At year-end 2001, there were 416 registered vehicles per 1 000 inhabitants in the whole country, 25 per cent more than in Helsinki.

Figure 4.2 Number of vehicles registered in Helsinki per 1 000 residents 1980-2002.



Source: Helsinki City Planning Department's Traffic Planning division

There were 8 700 motor cycles in Helsinki at year-end 2001, 2.5 times more than in 1980. The rise in the number of motorcycles has gathered speed each year since 1995. A similar trend is in evidence in Finland as a whole. At year-end 2001, there were 13 per cent more motorcycles in Helsinki and in Finland as a whole compared to the previous year. At year-end 2001, there were 3 400 mopeds in Helsinki. Since 1995, the number of mopeds has risen in the same way as the number of motorcycles.

Table 4.1 Number of vehicles registered (cars and motorcycles) in Helsinki 31 December 1980-2001.

	Vehicles Total	Cars	Vans and lorries total	Vans	Lorries	Buses	Special vehicles	Motor cycles
1980	132 542	114 796	15 725	10 419	5 306	1 266	755	3 216
1990	196 323	171 044	22 590	18 071	4 519	1 060	1 629	5 134
1995	178 265	157 544	18 403	14 974	3 429	930	1 388	5 534
2000	211 133	186 452	22 057	16 957	5 100	1 626	998	7 650
2001	214 299	187 921	23 849	17 975	5 874	1 558	971	8 650

Source: Finnish Vehicle Administration AKE

The number of vans has also risen in Helsinki since 1980, rising relatively more than the number of cars in the 1980s before declining in the early 1990s.

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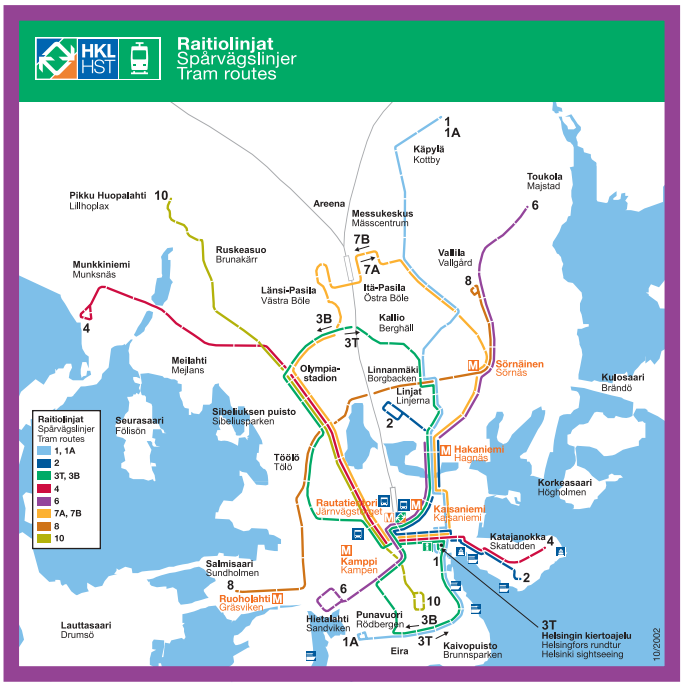
5. Public transport system

5.1 Route network and operation

The route network in the Helsinki region comprises an extensive bus system, tram, metro and commuter train traffic and ferries to the island of Suomenlinna. Most of the bus routes are radial, entering the city centre from various districts. Trams are the primary form of transport in the inner city. Feeder routes take advantage of the large transport capacity of the metro and commuter trains. Additionally, transverse bus routes complement the public transport system between local centres. There are some 54 km of Finnish State Railways' commuter train track, 21.1 km of metro track, 11 tram routes and 83.5 km of tramway in Helsinki. Bus routes total 3 280 km, with 109 bus services, which have been tendered out to private operators since 1997.

Map 5.1 Tram routes in Helsinki in 2002.

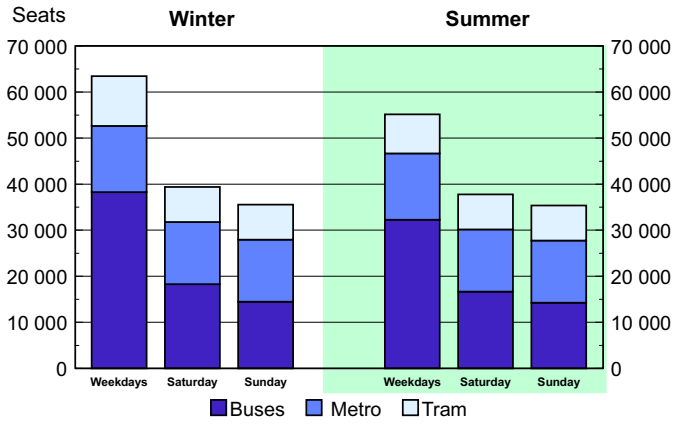


Source: Helsinki City Transport Department HKL

Since the second half of the 1990s, a comprehensive service route has been formed to complement normal scheduled traffic. Service buses also bring public transport within the reach of senior citizens and the disabled. There are currently 14 service routes.

Recent decades have seen a focus on increasing train and metro traffic. Ruoholahti metro station was completed in 1993 and the branch line of the metro, with new stations, to Vuosaari in 1998. The railway track to Tikkurila to the north in neigbouring Vantaa started operating in 1995 and a similar track to Leppävaara in the west was completed in summer 2002. Work is currently underway on building additional tracks between Tikkurila and Kerava, which lies some 30 kilometres to the north of Helsinki. These will be brought into use in 2004. Autumn 2005 will see the start up of Jokeri, a main public transport orbital route between Itäkeskus (Easten Centre in Helsinki) and Westend in Espoo. The route will operate using low floor natural gas buses.

Figure 5.1 Provision of passenger places on different days of the week in summer and winter 2001.



Source: Helsinki City Transport HKL

Bus traffic on the Helsinki routes was reduced between 1990 and 1995, since when there has been an increase in the provision of all modes of transport in response to growing demand. Buses provide around half (50%) of the passenger places, the metro 28 per cent and trams 22 per cent. Route operating times vary, but public transport operates between 5am and 2am on weekdays. At weekends and on Wednesdays, public transport operates almost around the clock since eight early morning bus routes operate on those nights.

5.2 Fleet

There are currently 656 buses, including 62 articulated buses and 50 six-wheelers, in operation on routes within Helsinki. The number of low floor buses has risen steadily

over the past ten years and currently accounts for 55 per cent of the bus fleet. Tendering has also led to a growing number of environmentally friendly natural gas powered buses, of which there are currently 60 in operation. There are also 16 mini- and midi-buses.

Of the 109 tramcars, 82 are articulated trams and 17 fairly old 4-axle cars. There are 10 new low floor trams in operation out of a total of 40 on order.

There are 54 metro units in operation, 12 of which were new trains that started operating in 2001. Finnish State Railways has also started to use new low floor trains in commuter traffic in the region. There are three passenger ferries to Suomenlinna.

5.3 Stations, stops, terminuses and park & ride

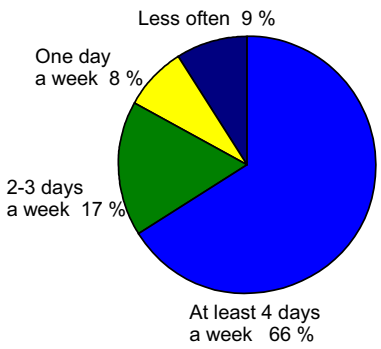
Stations, stops and terminuses form the public transport interface for passengers. These are the places where passengers also seek the information they require for their journey. The information system is an important part of the interface network formed by stops and stations.

There are 16 metro stations and 15 railway stations in Helsinki. There are also feeder bus terminuses at three metro stations and two railway stations. The largest bus terminuses are in the city centre. The new Eliel terminus near the central railway station started operating in 2002, when all routes departing from the bottom part of Kamppi switched to the terminus. Construction of a new underground bus terminus at Kamppi started in autumn 2002. Buses to south Espoo and long distance routes will start operating from the terminus in 2005.

5.4 Public transport users

An average of one journey per inhabitant is made by public transport each day and around 320 journeys a year. A journey means travelling from one point of departure to a destination and allows for a change of transport during the journey.

Figure 5.2 Public transport user frequency in 2001.



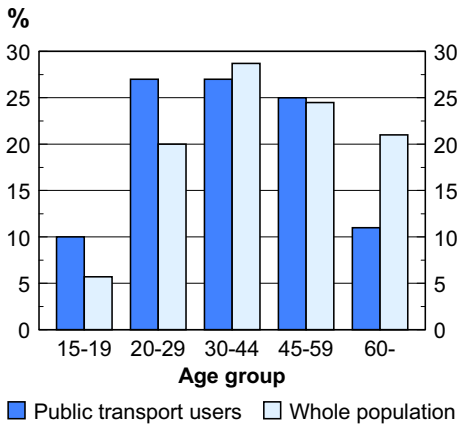
Source: Helsinki City Transport HKL

Passenger numbers travelling by public transport peaked in 1986, before starting to fall. The reason for the fall was the huge rise in the car stock and private motoring in the second half of the 1980s. The turnaround took place in 1991, since when there has been a steady increase in passenger numbers. Economic conditions, moderate ticket prices (including a tram ticket), an extension to the metro and a stricter parking policy have contributed to the growing popularity of public transport.

Most public transport passengers are regular passengers, travelling by public transport almost every day. Such passengers account for 66 per cent of public transport users. Occasional travellers, who travel in Helsinki no more than 2-3 times a month, account for roughly 10 per cent of passengers.

The passenger structure of public transport within Helsinki differs considerably from that of the population in terms of age and sex. Women make up 54 per cent of the Helsinki population and men 46 per cent. However, the figures for public transport passengers are 65 per cent women and just 35 per cent men.

Figure 5.3 Age distribution: public transport passengers and the Helsinki population in 2001.



Source: Helsinki City Transport HKL

Relatively more young people, 15-29 year-olds, travel by public transport than the percentage they represent in the population structure. Around 70 per cent of persons under 20 travel by public transport daily. Similarly, the share of over 60-year-olds using public transport is just half of the share represented by this age group in the entire population.

Helsinki inhabitants have accounted for a steadily increasing share of public transport in regional transport. To maintain the appeal and low cost of public transport, Helsinki, Espoo, Vantaa and Kauniainen have already worked together on tariffs and planning for 15 years.

Around 82 per cent of passengers use season tickets, 9 per cent ten-trip tickets and 9 per cent single tickets.

5.5 Standard of service and quality of public transport

The City Council has approved a planning instruction to control the quality of the public transport system. This instruction defines the guideline values for the following factors:

- accessibility of stops and stations (walking distances)
- operating hours
- route links (changes)
- passenger density in carriages (load factor)
- frequency.

The guideline values are implemented fairly well on the existing service network. Except for late evening and night traffic, 300-500 metres can be considered an acceptable walking distance to a bus or tram stop. Waiting time at bus or trams stops, or the time depending on frequency, is considered as one of the main factors indicating the level of service. In the suburbs, services to the city centre generally operate at 10-minute intervals during the rush hour and at intervals of under 20 minutes during the day and in the evenings. Buses travel at an average speed of 26.5 kph and trams at 15.5 kph.

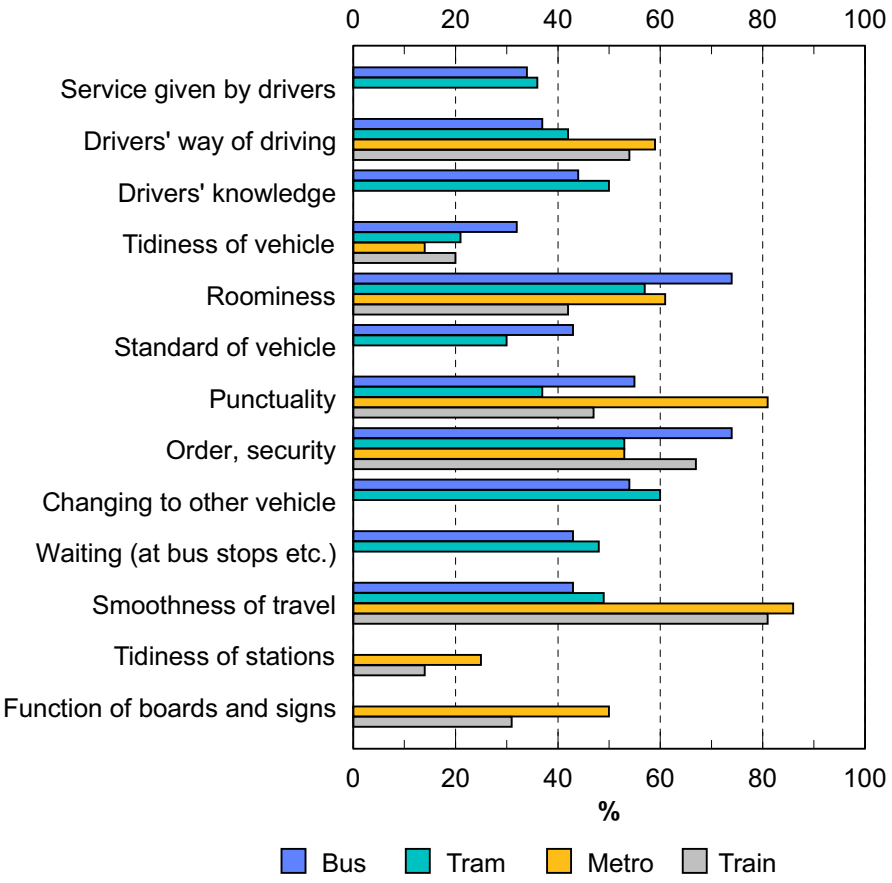
Map 5.2 Journey times to the city centre by public transport during the rush hour in 2001.

Source: Helsinki City Transport HKL

Customer satisfaction has been systematically monitored in Helsinki since 1995. Indeed, customer satisfaction was studied before then but apart from a few exceptions, the studies were of a non-recurring nature. The monitoring of customer satisfaction introduced in 1995 conducts continuous passenger surveys on almost all routes. During the year, responses are obtained from around 9 000 passengers, who assess each quality factor on a grade on 4-10. Results for 2001 show that the metro received the highest grades in both subsections: 8.36 for the operator and 8.65 for the system.

The metro's strengths lie in smooth journeys and punctuality, those of bus traffic lie in passenger density, order and bus cleanliness. Tram traffic was ranked for the standard of driver services, tram stop conditions and the ease of changing trams. Finnish State Railways' good points in commuter traffic were smooth journey and clean carriages.

Figure 5.4 Percentage of various quality factors graded excellent (9-10) in different modes of transport in autumn 2001.



Source: Helsinki City Transport HKL

Aside from continually monitoring customer satisfaction, Helsinki is also involved in the international BEST project, which was launched in 2000 and continues until 2005. The project aims to ascertain which European city has the best public transport system. There are nine European cities taking part: Stockholm, Oslo, Helsinki, Copenhagen, Vienna, Barcelona, Geneva, London and Manchester. An annual customer satisfaction survey is conducted in each city. In 2002, Helsinki was proved to have the best public transport system.

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6. Traffic and passenger volumes

6.1 Vehicle trends

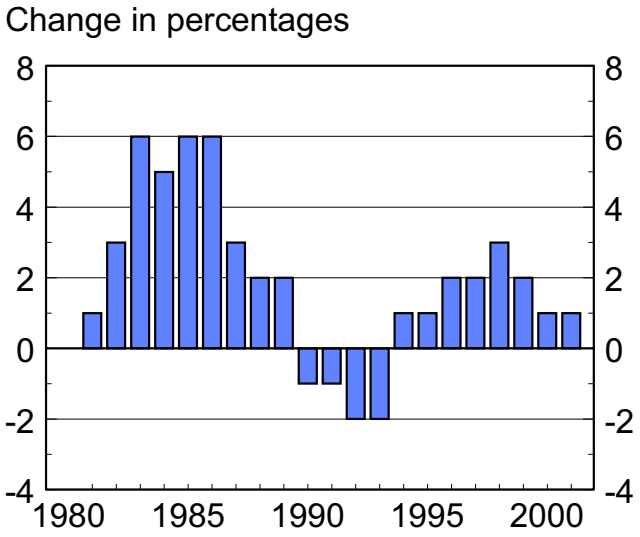
Each day, 260 000 cars and trams cross the city centre boundary. The number of vehicles crossing the city boundary is double that crossing the city centre boundary. Except for the years of recession in the early 1990s, car traffic in Helsinki has grown continually since 1980. Overall, traffic has risen by around 50 per cent since 1980. The highest increase has been on the city boundary, where traffic has doubled.

One of the reasons for this is that jobs are concentrated in Helsinki and housing is scattered around neighbouring municipalities. Parking restrictions in the city centre have also meant that some car passenger journeys are destined for places other than the city centre.

Traffic trends have differed within the inner city, with just a 12 per cent rise in traffic crossing the city centre boundary and 28 per cent crossing the inner city boundary since 1980. Traffic crossing the city boundary has increased in different ways in different directions, with a markedly greater increase in the northeast of Helsinki (from Tuusulanväylä to Lahdenväylä) than elsewhere. Growth in transverse traffic in the suburbs has led to an almost four-fold increase in traffic on Ring I since 1980.

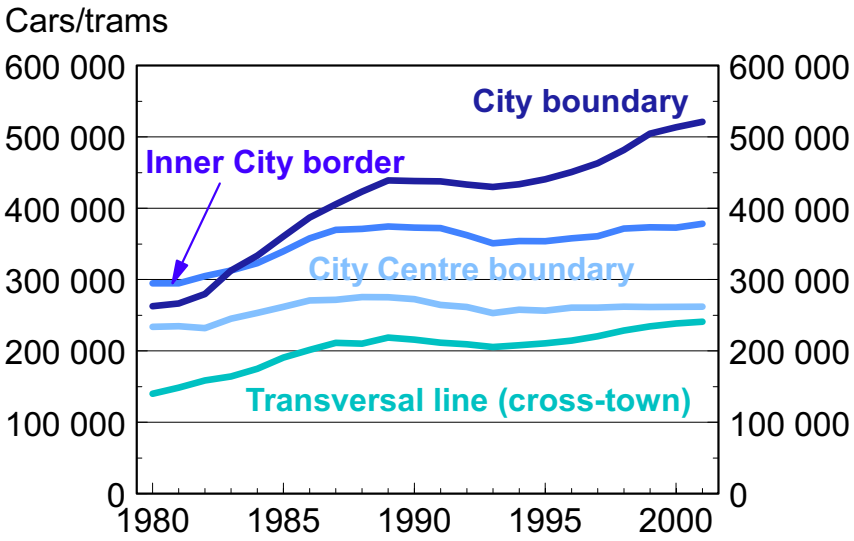
The impacts of the recession in the early 1990s were most in evidence in traffic on the city centre and inner city boundaries. Since the recession, traffic on the city centre and inner city boundaries has risen by 4 per cent and 8 per cent respectively. Traffic growth has been considerably higher (21%) on the city boundary and on transverse suburban routes (32%), which in practice means Ring I.

Figure 6.1 Annual change in per cent in vehicle traffic in Helsinki 1981-2001.



Source: Helsinki City Planning Department's Traffic Planning Division

Figure 6.2 Traffic numbers on cordon lines 1981-2001.

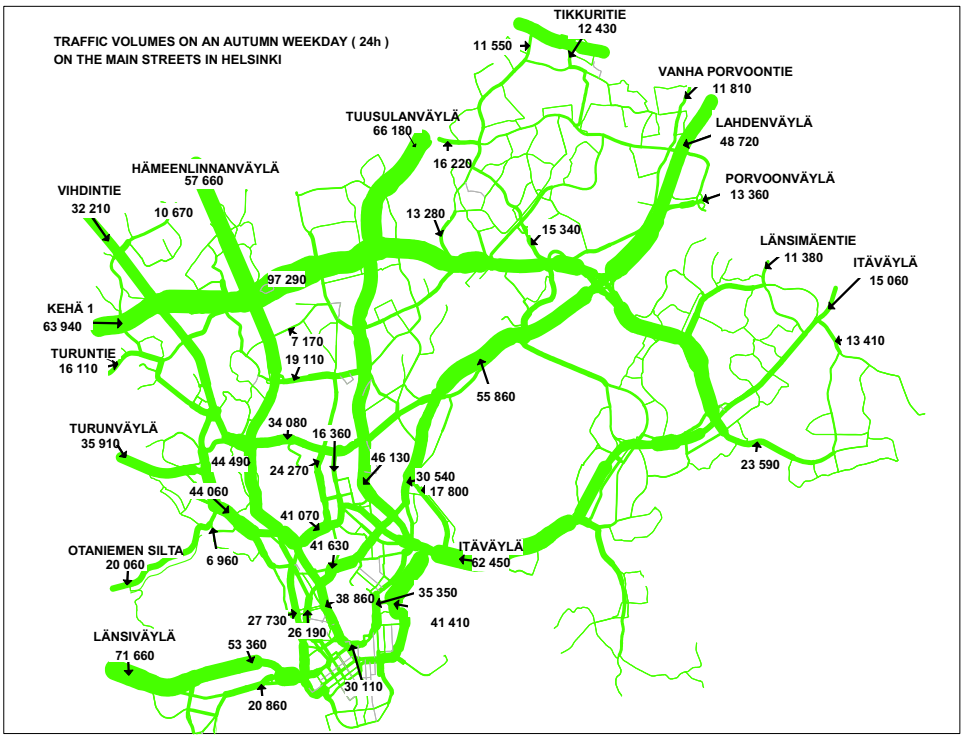


Source: Helsinki City Planning Department's Traffic Planning Division

Compared to 1990, traffic is still 4 per cent less on the city centre boundary, about the same on the inner city boundary and 19 per cent higher on the city boundary. An examination of traffic growth in various parts of Helsinki since 1993 shows that traffic on the city centre boundary and inner city boundary has grown most in the west.

Traffic on the city boundary has grown most in the northwest. Traffic in Helsinki has risen most on transverse streets in suburban areas, or in practice on Ring I.

Map 6.1 Vehicle numbers on the main street network in Helsinki during a 24-hour period on an autumn weekday in 2001.



Source: Helsinki City Planning Department's Traffic Planning Division

6.1.1 Busiest streets and stretches of main roads

The busiest thoroughfare in Helsinki is Ring I, which has the greatest volume of traffic on the stretch near the Central Park, where some 97 000 vehicles pass a day. Elsewhere on Ring I, the number varies between 50 000 and 85 000 vehicles a day. The second busiest point is Länsiväylä on the city boundary, which, at 72 000 vehicles a day, has the highest volume of traffic crossing both the city and inner city boundary.

6.1.2 Analysis of traffic by hour and vehicle

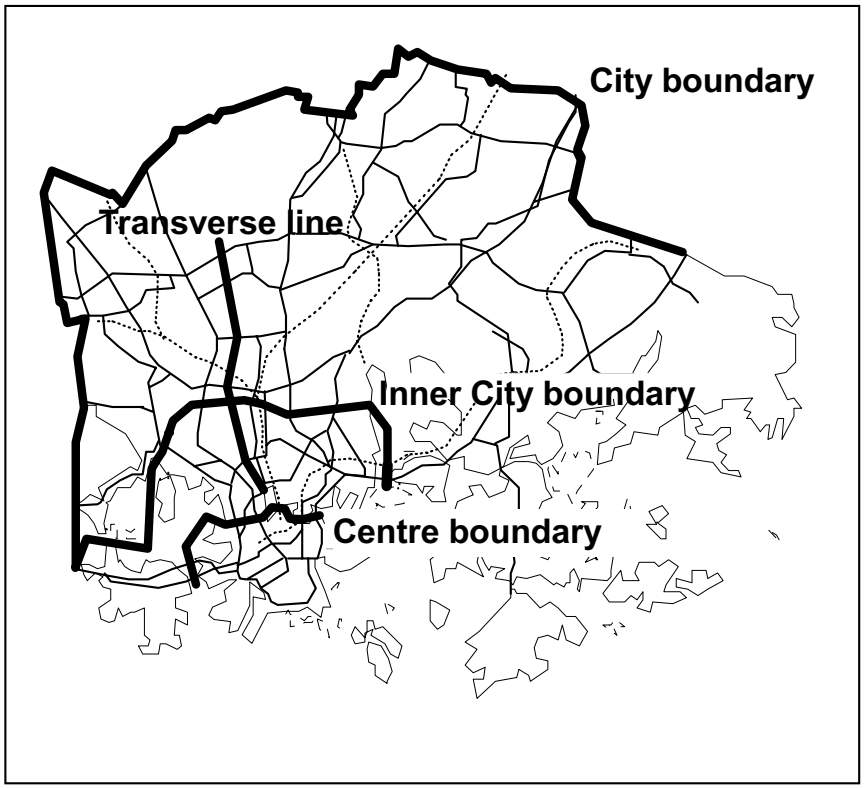
Whereas traffic in the city centre is fairly balanced throughout the day, there are more marked congestion peaks in the suburbs.

Approximately one in six vehicles driving on the main streets of Helsinki is a vehicle other than a car. Vans account for one in ten vehicles and other goods vehicles for almost 5 per cent. There are more public transport vehicles - buses and trams – in the centre than elsewhere in the city.

6.1.3 Traffic monitoring

Vehicle trends in Helsinki are monitored through traffic counts, which measure traffic trends as vehicle numbers (including trams). The counts are carried out by Helsinki City Planning Department. Motor vehicle traffic is counted each year in September on three circular cordon lines and one transverse line. Almost all the traffic on these is counted. In addition to these so-called orbital points, traffic is monitored elsewhere on the main street system at a total of 90 points, using a counting device in 81 points. Fifteen of these counting points are built and maintained by the Finnish Road Administration. The 44 counting points on the ring road have been selected to cover the principal radial and transverse routes in Helsinki.

Map 6.2 Traffic cordon lines in Helsinki.

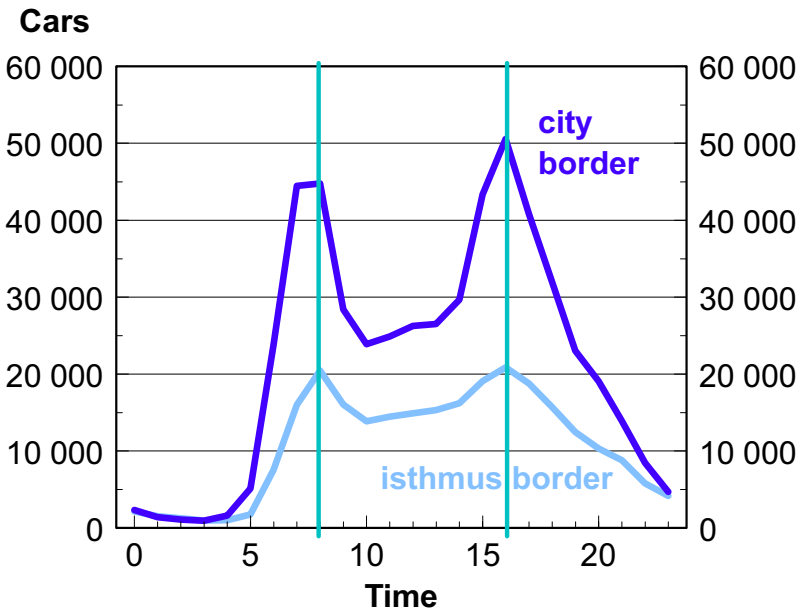


Source: Helsinki City Planning Department's Traffic Planning Division

6.1.4 Traffic mileage

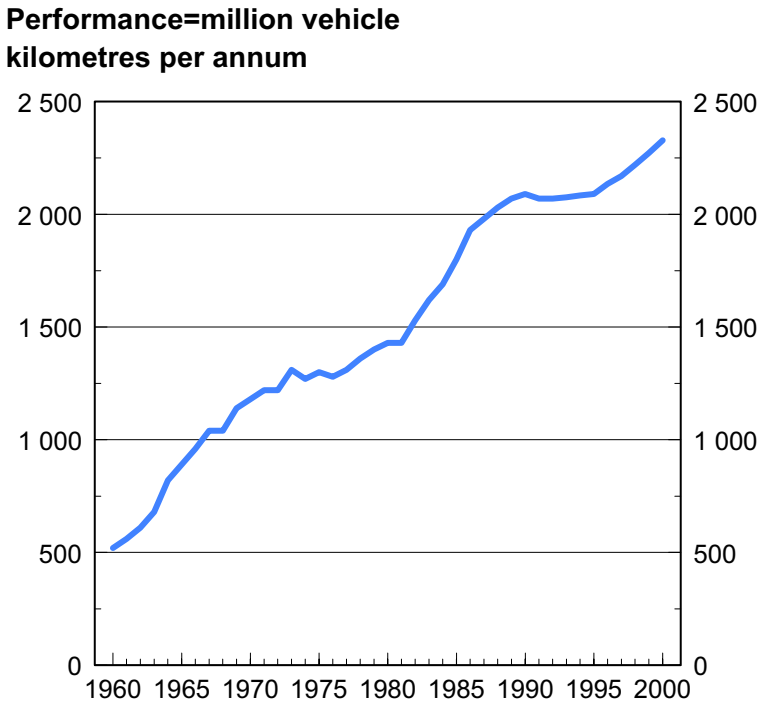
Traffic volume can also be measured in terms of traffic mileage, in other words the number of kilometres driven by vehicles in a certain time (vehicle kilometre). An average of 6.38 million vehicle kilometres a day were driven on the streets of Helsinki in 1990 and 7.13 million in 2000. Similarly, annual traffic mileage was 2 090 million vehicle kilometres in 1990 and 2 328 million in 2000.

Figure 6.3 Analysis of traffic on the city centre and city boundaries by time of day in 2001.



Source: Helsinki City Planning Department's Traffic Planning Division

Figure 6.4 Traffic mileage trend in Helsinki 1960-2000 (million vehicle kilometres p.a.).



Source: Helsinki City Transport HKL

6.2 Public transport passengers

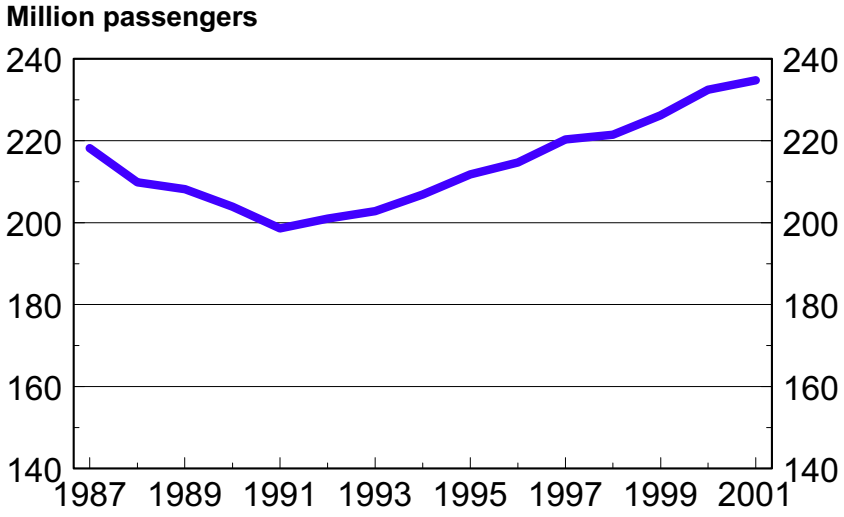
6.2.1 Bus, tram and metro passengers

This review applies to public transport within Helsinki, in other words the journeys made by public transport that begin and terminate in Helsinki. In this context, passenger number means the number of passengers boarding public transport vehicles. If, the first part of a passenger's journey was by bus and the second part by tram, this is registered as two journeys.

A total of some 810 600 journeys by public transport were made within Helsinki on a single autumn weekday in 2001. Of this figure, 734 600 journeys were made on internal Helsinki routes and 76 000 on regional routes and Finnish Railways commuter trains.

During the whole of 2001, a total of 210.9 million journeys were made on internal routes in Helsinki and 23.6 million on regional routes. Many changes have taken place in long-term trends in passenger numbers over the years. A look at the trend from the mid-1980s to the present day shows two stages of development. Passenger numbers declined until 1991, since when they have risen in a fairly straight line to the present day.

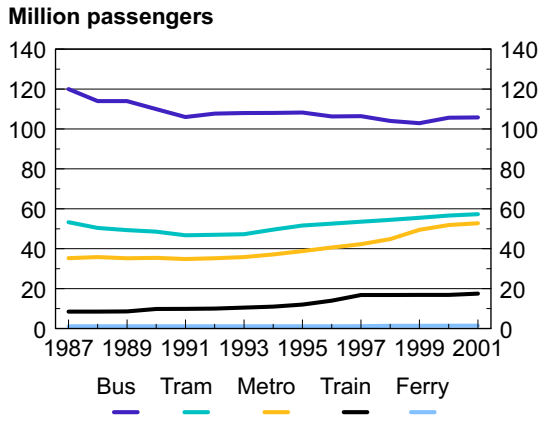
Figure 6.5 Public transport passenger numbers in Helsinki 1987-2001.



Source: Helsinki City Transport Department HKL

An examination of the forms of transport shows that the greatest change has been a steady decline in bus travel over the years, whereas there has been a steady increase in rail travel. In 2001, rail traffic had a 53.7 per cent share of weekday journeys made, buses 45.9 per cent and water transport 0.4 per cent. Passenger numbers have risen in all forms of rail transport. The greatest change, however, has been in metro traffic, where daily users will soon be in the same magnitude as in tram traffic.

Figure 6.6 Annual passenger numbers for different modes of transport in public transport within Helsinki 1987-2001.

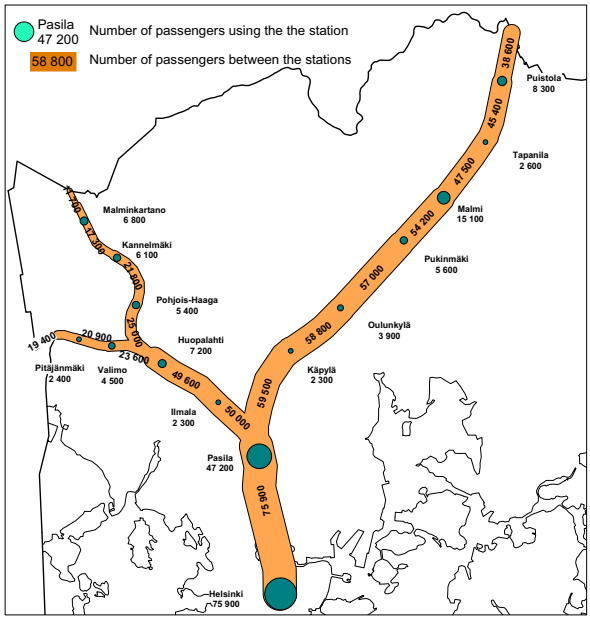


Source: Helsinki City Transport HKL

6.2.2 Train passengers

On an October weekday in 2001, 195 000 commuters used stations in Helsinki. Since 1981, the number of train passengers has risen by 49 per cent. Construction development has led to greater use of the stations at Pasila and Malmi in particular. In 2001, 39 per cent of commuter passengers at stations in Helsinki used the central railway station and 24 per cent Pasila station.

Map 6.3 Number of commuter train passengers during a 24-hour period on a weekday in October 2001.



Source: Finnish Railways, passenger counts

In 1986, 82 000 commuter and long-distance passengers crossed the city centre boundary on a weekday. The figure for 2001 was 90 400 passengers, of which 84 per cent were commuter passengers. Likewise 103 000 commuter and long-distance passengers crossed the inner city boundary in 1986 and 127 700 in 2001. The corresponding figures for the city boundary were 80 000 in 1986 and 88 000 in 2001. Passengers on commuter trains accounted for 79 per cent of these figures.

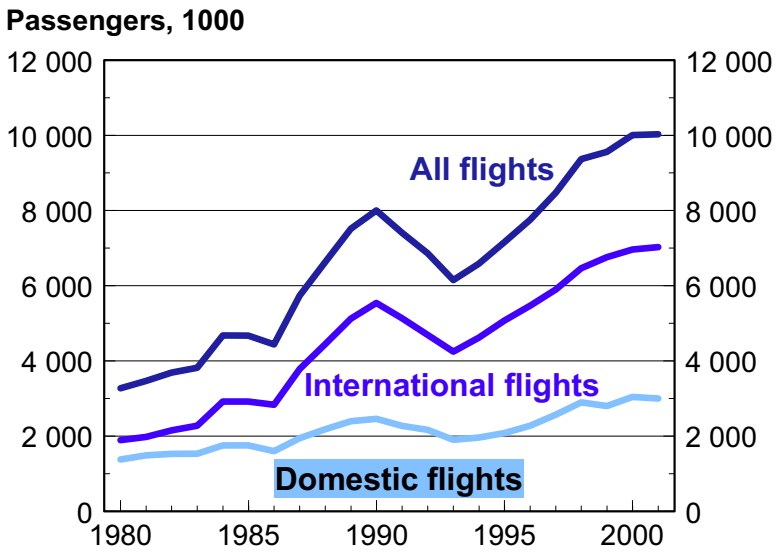
6.2.3 Ship passengers

Passenger numbers through Helsinki harbours have risen constantly. In 1980, there were 1.3 million passengers, in the late 1980s the number of passengers started to rise sharply to reach 3.9 million in 1990. Estonian independence in 1991 further fuelled the dynamic rise in traffic to Tallinn. Of the 9.3 million passengers passing through Helsinki harbours in 2000, Estonia accounted for 67 per cent, Sweden for 29 per cent, Germany for 2 per cent and other countries 2 per cent.

6.2.4 Air passengers

There has been a continual increase in landings at Helsinki-Vantaa Airport, with 83 000 aircraft landing in 2001, an increase of 25 per cent on the figure for 1990. In 2001, 58 per cent of landings were international flights and 42 per cent domestic flights.

Figure 6.7 Number of passengers at Helsinki-Vantaa Airport (1000 persons) 1980-2001.



Source: Finnish Civic Aviation Administration

Around 3.3 million passengers passed through Helsinki-Vantaa Airport in 1980. The late 1980s saw a brisk growth in international traffic in particular and in 1990,

there were 8 million passengers passing through the airport. The recession of the early 1990s was also felt by airlines, with passenger numbers declining in both international and domestic traffic alike. After 1993, passenger numbers started to rise strongly again to reach just over 10 million passengers, 70 per cent of which travelled abroad, in 2001. Passengers at Helsinki-Vantaa Airport accounted for 72 per cent of the total number of air passengers in Finland as a whole in 2001.

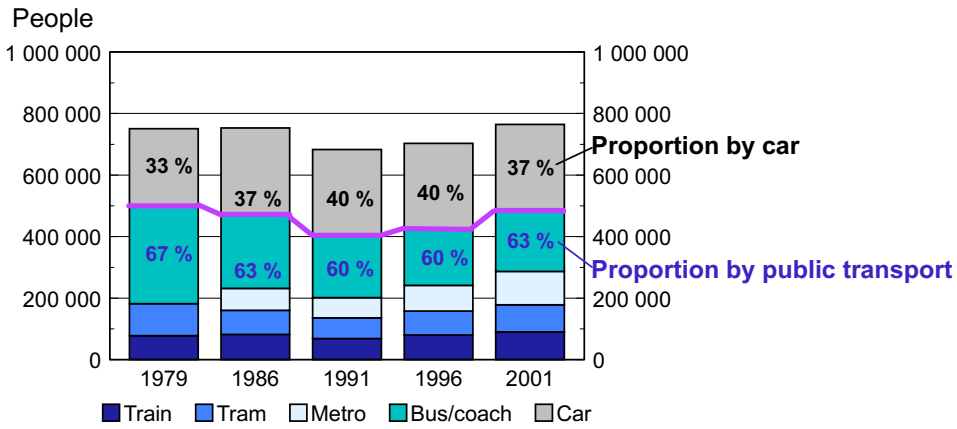
6.3 Analysis of modes of transport

Analysis of the modes of transport measures public transport trends and the share of passenger transport. Counts are made in both directions on one weekday and in the morning rush hour into the city centre between 6am and 9am.

The mode of transport is monitored by passenger counts for public transport and the number of passengers in cars is obtained by multiplying the number of cars by the average passenger loading factors. Loading counts have been performed since 1969. The latest were carried out in 1997, when the average daily loading factor for traffic on the city centre boundary was 1.35 and 1.29 in the morning rush hour.

At the turn of the 1980s, there was a fairly high number of passenger traffic using public transport, 75 per cent in the morning rush hour and 67 per cent for the 24-hour period as a whole. The rapid growth in the vehicle stock in the 1980s increased motoring and reduced the share of public transport. The number of persons using public transport over a 24-hour period started to rise again in the 1990s. The number of jobs fell in the city centre in the 1990s and the number of people using public transport during the morning rush hour declined in the early 1990s before beginning to rise again in 1998. In 2001, passengers using public transport accounted for 70 per cent of persons in the morning rush hour and 63 per cent over the day as a whole.

Figure 6.8 Passenger traffic crossing the city centre boundary by mode of transport during a 24-hour period on a weekday in October 1979, 1986, 1991 and 2001.



Source: Passenger tallies made by Helsinki City Transport HKL and Helsinki City Planning Department's Traffic Planning Division

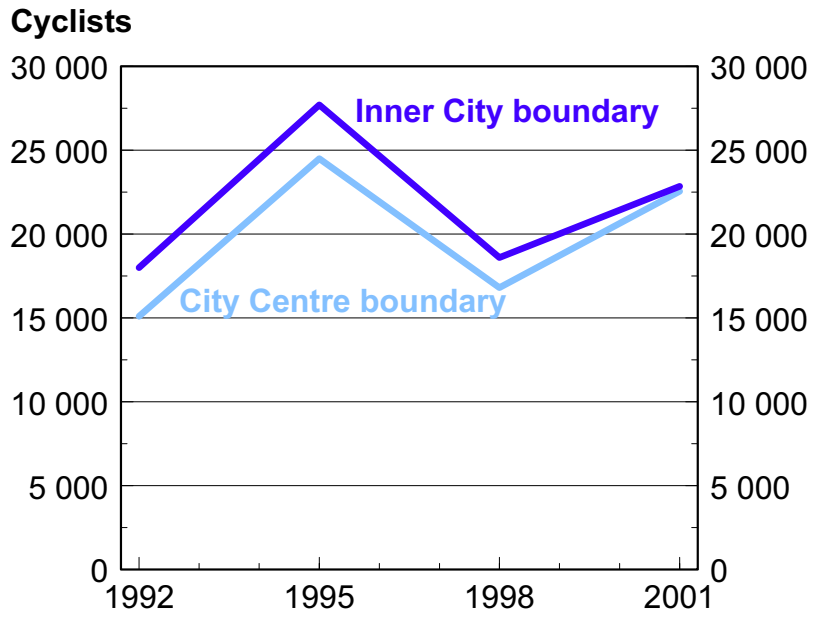
On the inner city boundary, the share of public transport was 53 per cent a day in 1990 and 55 per cent in 1999. In the morning rush hour towards the city centre the figures were 61 per cent in 1990 and 62 per cent in 1999.

On the city boundary, the share of public transport was 29 per cent a day in 1990 and 28 per cent in 1999. In the morning rush hour towards the city centre the figures were 41 per cent in 1990 and 40 per cent in 1999.

6.4 Cyclists

The active cycling season is from April to October. The weather has a heavy impact on cycling and wet weather can reduce cycling by 10-40 per cent.

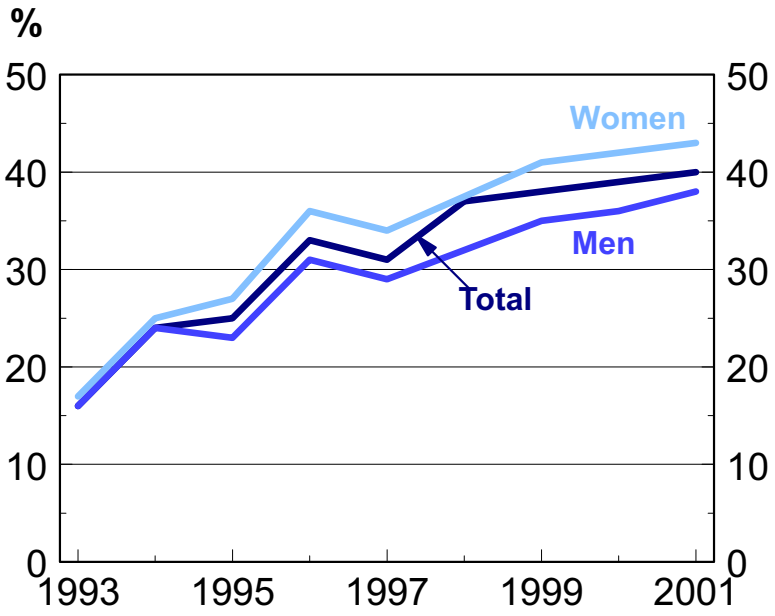
Figure 6.9 Cyclists crossing the city centre and inner city boundaries on a June weekday 1992-2001.



Source: Helsinki City Planning Department's Traffic Planning Division

The number of cyclists crossing the city centre and inner city boundaries is counted manually on one day in June every three years. Counts have been made since 1992. In 1992, cyclists were counted at 13 points on the city centre boundary and at 25 points on the inner city boundary. In June 1992, 15 100 cyclists crossed the city centre boundary. The figure for June 2001 was 22 550 cyclists. The corresponding figures for the inner city boundary were 18 000 for June 1992 and 22 850 for June 2001. On a fine summer day in 2001 over 28 000 cyclists crossed the city centre boundary and almost 33 000 crossed the inner city boundary. On a summer day in 2001, 21 150 cyclists crossed the city centre boundary. Even though the number of cyclists has varied each year depending on the weather, the overall trend is upwards.

Figure 6.10 Use of helmets by cyclists in Helsinki 1993-2001.



Source: Helsinki City Planning Department

Use of cycling helmets has been counted since 1993, when just 16 per cent of cyclists wore one. Counts in summer 2001 showed that 40 per cent of cyclists wore a helmet. The figures for women and men were 43 per cent and 38 per cent respectively. Cycling helmets are mostly worn when cycling to or from work.

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7. Car traffic flow

Traffic flow is sensitive to occasional disruptions, the significance of which increases when various journey types and modes of transport intermingle. Journey time varies least on motorways and most in the inner city.

During the recession in the early 1990s, traffic volumes declined and traffic flowed much more smoothly. In 2001, there was 2 per cent more traffic on the inner city boundary, 19 per cent more on the city boundary and 12 per cent more on transverse routes than in 1991. Traffic on Ring I has increased especially in the morning and evening rush hours.

7.1 Morning rush hour into the city centre

Traffic throughput on roads into Helsinki declines as the centre approaches. Traffic flowing smoothly on motorways queues on the main streets into the centre. Traffic signals at the end of motorways regulate traffic entering the street network so that traffic still flows fairly well on the main streets. Nevertheless, during the morning rush hour traffic does not flow into the city centre without congestion.

Between 1991 and 2001, average journey speed fell considerably on all routes. Only journeys coming from the direction of the Lahdenväylä motorway have become slightly quicker.

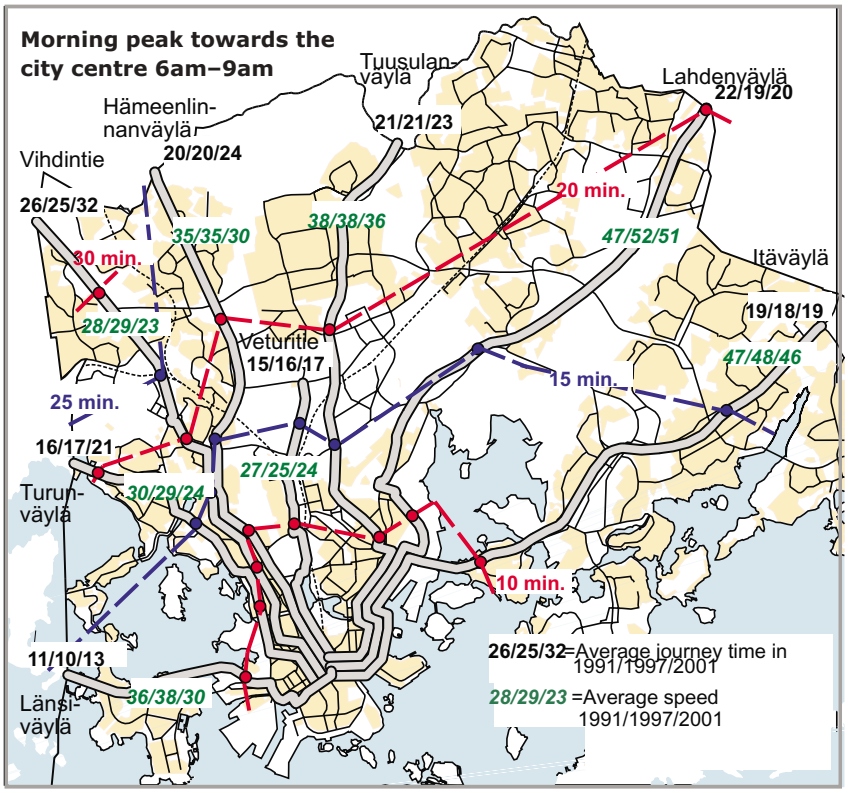
In 2001 the average journey time to the city centre was 32 minutes and the average speed was just 23 km/h. In 2001 the average speed on the Lahdenväylä route was 51 km/h.

Travel time zones in the morning rush hour towards the city centre extended increasingly further from Erottaja towards Itäväylä and Lahdenväylä in 2001. Journey length driven in these directions was longest in a comparison of time zones.

Average speeds during the morning rush hour on most transverse routes in the inner city declined to 21-29 km/h between 1991 and 2001.

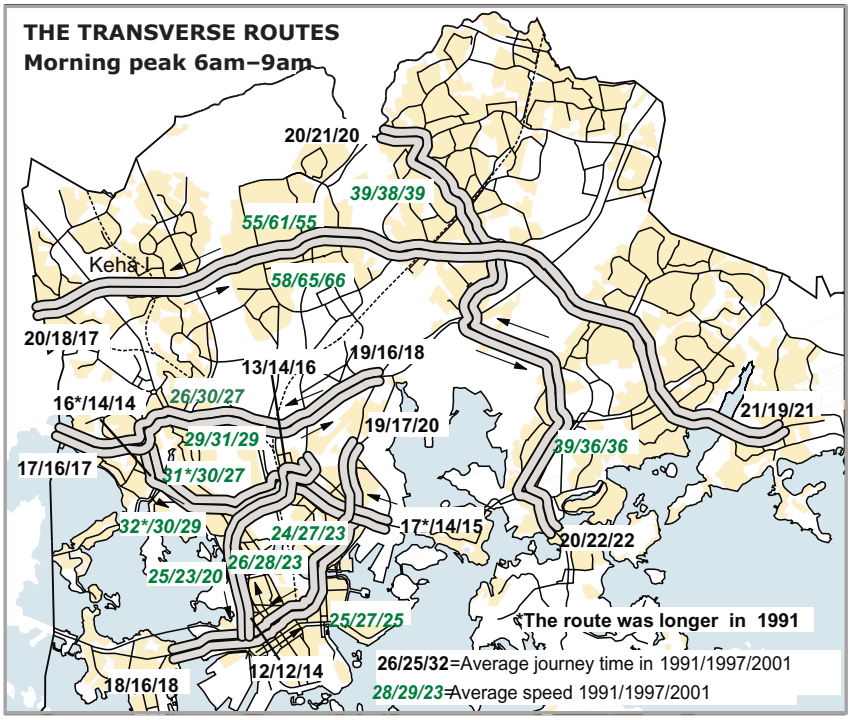
Going westwards on Ring I, average journey speed rose between 1991 and 1997 before falling again in 2001 to the 1991 level. Average journey speed eastwards has risen continually. Enhancements such as graded intersections have been made to Ring I to improve traffic flow and in some places there has been a marked improvement. However, in other places, e.g. near the Espoo boundary, traffic flow has deteriorated.

Map 7.1 Morning rush hour into the city centre 1991, 1997 and 2001.



Source: Helsinki City Planning Department's Traffic Planning Division

Map 7.2 Morning rush hour on transverse routes 1991, 1997 and 2001.

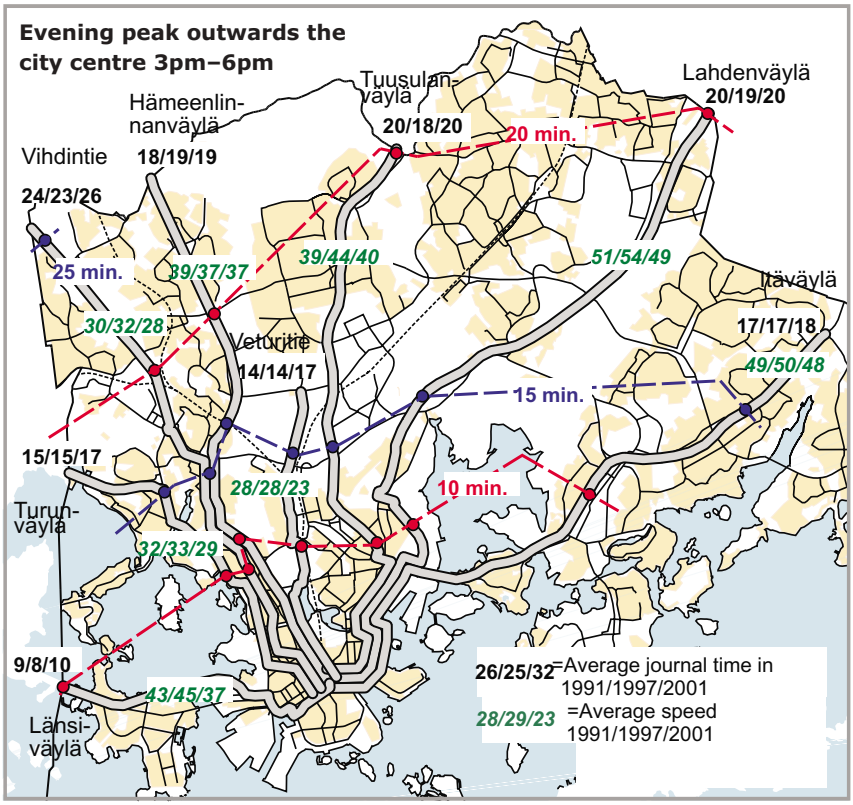


Source: Helsinki City Planning Department's Traffic Planning Division

7.2 Evening rush hour out of the city centre

On radial routes the evening rush out of the city centre flows more smoothly than on almost all other measured routes. Unlike during the morning rush hour, there are no bottleneck junctions regulating traffic in the evening rush hour. However, various events, road works and other disruptions congest traffic more quickly than normal and thus affect traffic flow.

Map 7.3 Evening rush hour out of the city centre 1991, 1997 and 2001.

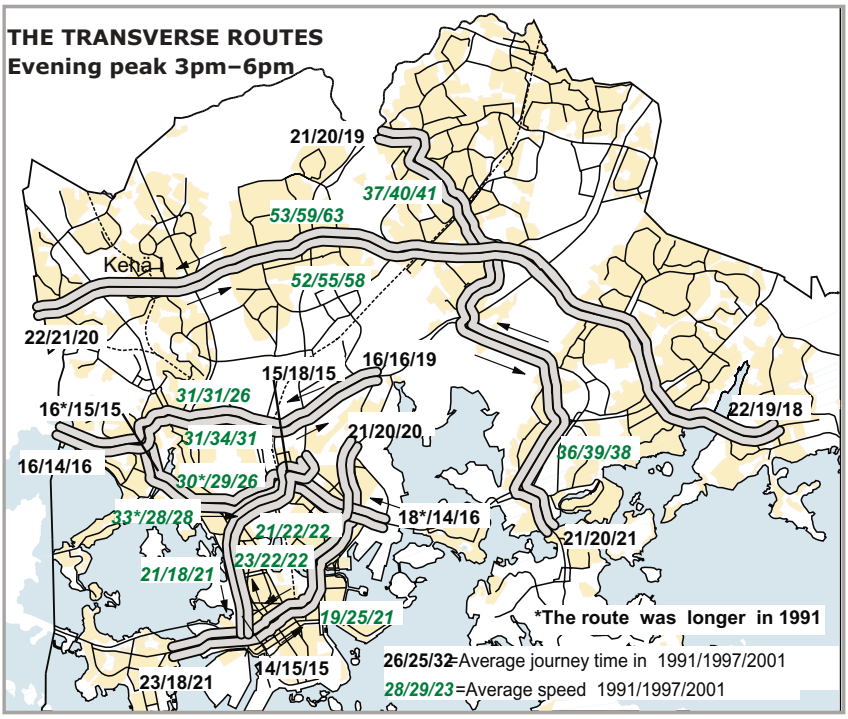


Source: Helsinki City Planning Department's Traffic Planning Division

Between 1991 and 2001 journeys in the direction of Länsiväylä slowed considerably. Unlike on radial routes, evening rush hour traffic in the very city centre does not flow as smoothly as in the morning. In 2001, average speeds on transverse routes in the inner city varied between 21 and 31 km/h.

Average evening rush hour speeds on Ring I rose between 1991 and 1997, despite much heavier traffic. In 2001, the average speed westwards was 63 km/h and eastwards 58 km/h.

Map 7.4 Evening rush hour on transverse routes 1991, 1997 and 2001.



Source: Helsinki City Planning Department's Traffic Planning Division

7.3 Traffic flow monitoring

Car traffic flow in Helsinki has been monitored on 14 routes every other year since 1991. Flow rates have been measured using the so-called floating car method, where three vehicles equipped with measuring instruments drive freely with other traffic. The measuring program records speed and delay data every 10 seconds. Traffic flow rate measurements are output for three periods: the morning rush hour 6am-9am, day traffic 9am-3pm and the evening rush hour 3pm-6pm. Traffic flow rates are monitored both along the entire route and on stretches, or between links, of which there are usually 5-16 depending on the length of the route.

Flow rate measurements provide data on driving speed, travel speed (speed including delays or stops), delays and journey times.

7.4 Comparison of car and bus flow rates

Except on a few routes measured, there are no major differences in average journey times for cars and buses. In Helsinki on the other hand, journey times by car are faster than buses into and out of the centre. Buses are slowed by stops, which account for 10-15 per cent of total journey time during the rush hour. On the other hand, bus lanes cut journey times enabling buses to complete some stretches of the journey faster than

cars. In Helsinki, regional buses make fewer stops than Helsinki City Transport buses and are thus faster. Journey times by bus vary more than those by car. Journey times by bus and car have been examined only in Helsinki.

Regional buses towards Länsiväylä are faster than cars, especially in the morning rush hour, when the journey from the city boundary was four minutes less than by car. In the evening rush hour, the bus takes just a minute less than a car.

In the morning rush hour in particular, the bus is a competitive option compared to the car. Of eight routes measured during the morning rush hour, buses are much faster than cars when driving from Länsiväylä, Vihdintie and Hämeenlinnanväylä to the city centre. In evening rush hours, the bus is quicker only towards Länsiväylä.

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8. Road accidents

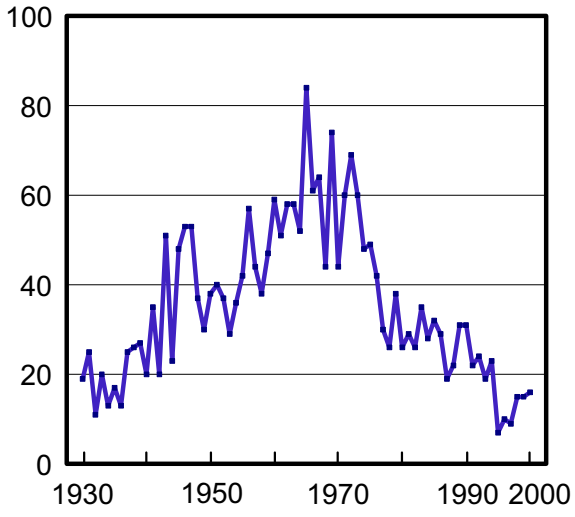
The social costs of road accidents in Helsinki are almost €300 million a year. The risk of death on the road is greater than that during leisure time or at work. Attempts are being made to improve road safety in many different ways: traffic planning, control, education, legislation, vehicle R&D and new technology.

8.1 Road safety trend

Today, traffic in Helsinki claims only a fifth of the number of fatalities it did in the late 1960s. In 1969, 59 pedestrians lost their lives in Helsinki. Thirty years later the figure was just 7, despite a two-fold rise in the number of kilometres driven.

During the 1970s, the number of road accident victims in Helsinki and elsewhere in Finland fell by around 50 per cent. The 1970s saw the introduction of speed limits on main Finnish roads and the compulsory use of seat belts in the front seats of passenger cars.

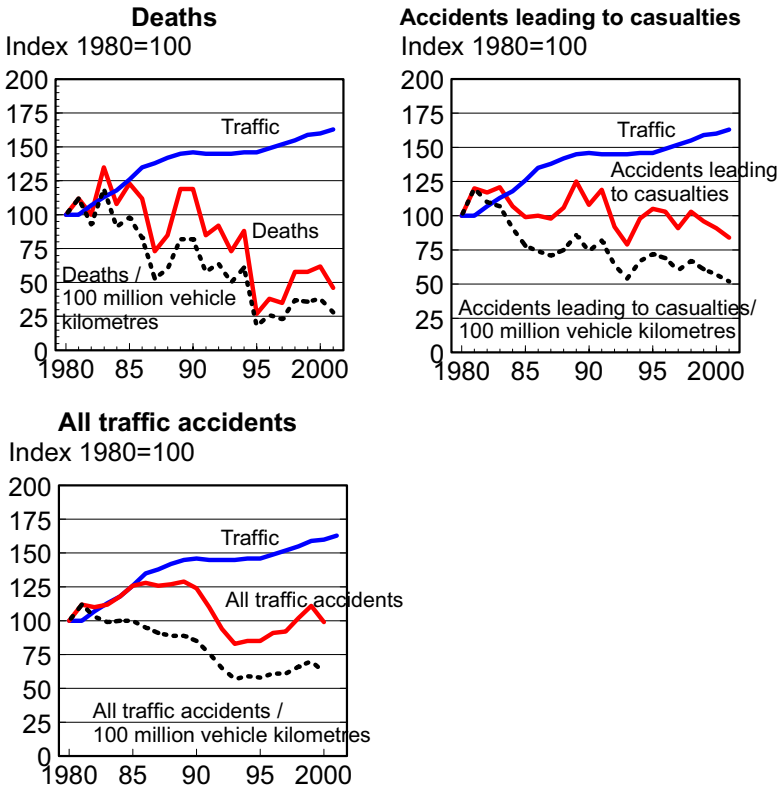
Figure 8.1 Number of fatalities in road accidents in Helsinki 1930-2000.



Source: Helsinki City Planning Department's Traffic Planning Division

The downward trend in road accidents came to an end in the 1980s, although did not rise at the same dramatic rate as the number of kilometres driven. Speed limits of 30 km/h and 40 km/h were extensively introduced in suburban residential areas in Helsinki.

Figure 8.2 Road accidents, accidents involving personal injury, deaths and vehicle mileage in Helsinki 1980-2001.



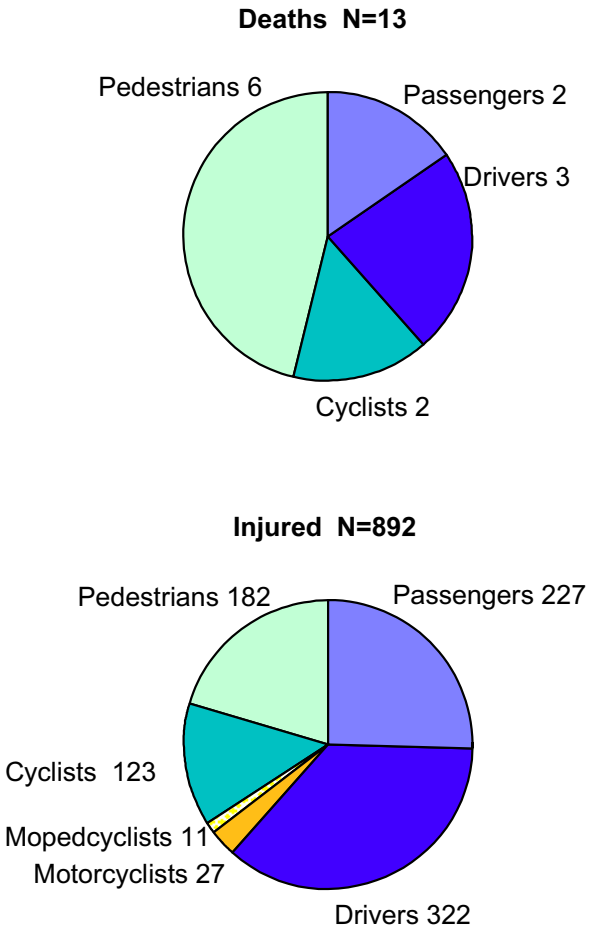
Source: The Committee of Insurance Companies VALT's register on traffic accidentd, the RIKI accident register of Helsinki City Planning Department's Traffic Planning division

In the first half of the 1990s, the number of road deaths fell sharply in Helsinki and the rest of Finland alike. A 40 km/h speed limit was introduced on most residential and commercial streets in the inner city of Helsinki in March 1992. Speed bumps and other structural traffic calmers were introduced on suburban residential streets to control driving speeds.

8.2 Deaths and injuries

Between 1997 and 2001, an average of 13 people were killed and 892 people injured each year on Helsinki roads. Every other death involved a pedestrian and two thirds of persons in the injuries statistics involved motorists.

Figure 8.3 Average deaths and injuries in Helsinki by transport category 1997-2001.



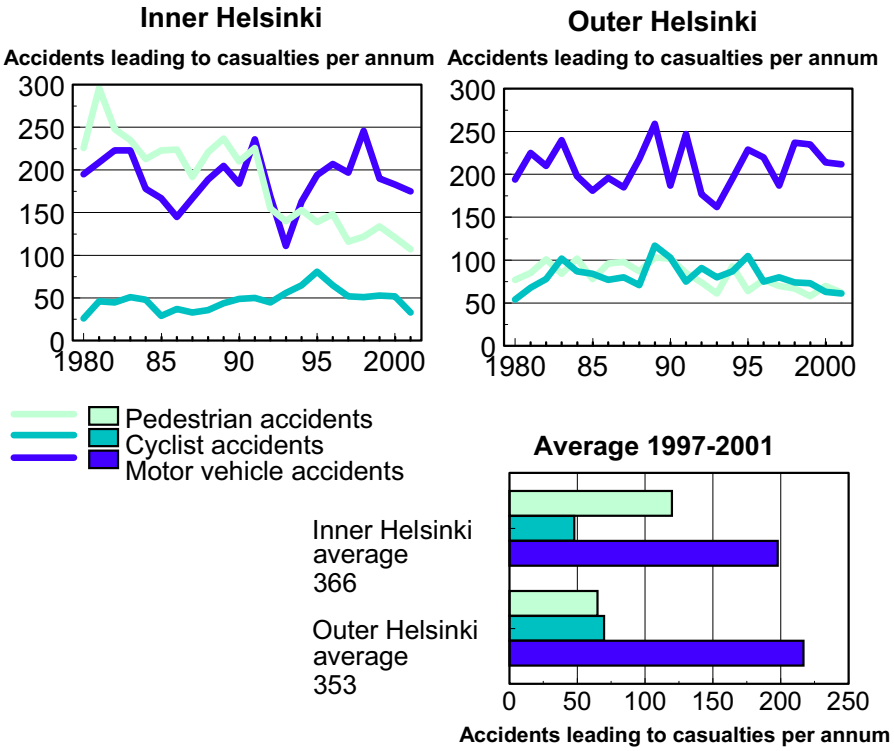
Source: Traffic accident register of Helsinki City Planning Department's Traffic Planning division

Annual road fatalities in Helsinki have fallen from just under 30 in the second half of the 1980s to an average of 13 today. A similar trend has been noted elsewhere in Finland. However the risk of death on the roads is lower in Helsinki than elsewhere in the country. The number of injuries on Helsinki roads has not declined as dramatically as the number of deaths. The number of passenger injuries fell during the 1980s, the number of pedestrian victims has fallen since 1992 and the number of cycling victims since 1996.

8.3 Inner city and suburbs

Traffic in the suburbs is safer than in the inner city and 70 per cent of vehicle kilometres driven is in the suburbs.

Figure 8.4 Average annual number of accidents resulting in personal injury 1997-2001 (inner city = city districts 1-27).



Source: Accident register of Helsinki City Planning Department's Traffic Planning division

Accidents involving pedestrians take place mainly in the inner city (65%, 1997-2001). More accidents involving cyclists occur in the suburbs. The number of accidents involving motorists is similar in both the inner city and suburbs. Motorways, which account for over 40 per cent of kilometres, are among the safest roads in the city.

8.4 Accidents by road type

Motorways have been designed to meet the needs of road traffic. Most of the traffic network in the city centre took shape during the age of horse-drawn vehicles. Modern through traffic, property maintenance, buses, trams, cyclists and pedestrians still move about and crisscross in the same cramped environment.

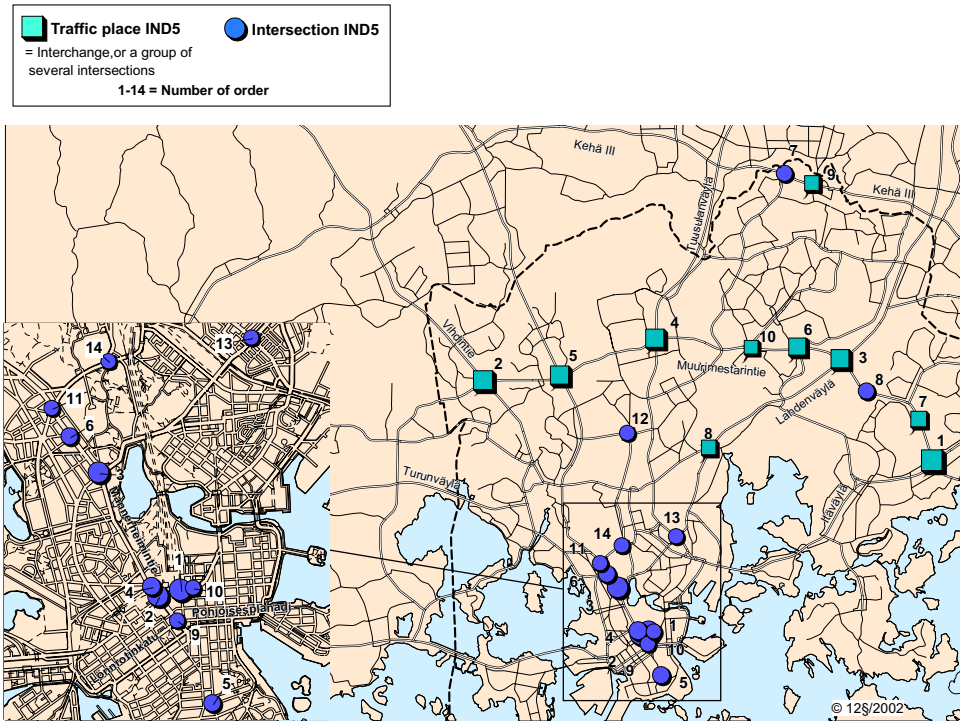
Per kilometre driven, the number of deaths and injuries is virtually 50-times higher on the most dangerous commercial street in Helsinki compared to the safest motorways.

8.5 Accident black spots

On average, two in three accidents involving personal injury occur at road junctions.

Most of the worst accident black spots at junctions are in the very centre or on main roads in the inner city and the worst traffic spots at busy junctions on Ring I. The worst accident black spot for pedestrians is at the junction of Kaivokatu and Keskuskatu streets.

Map 8.1 Accident black spots in Helsinki each year 1999-2001.

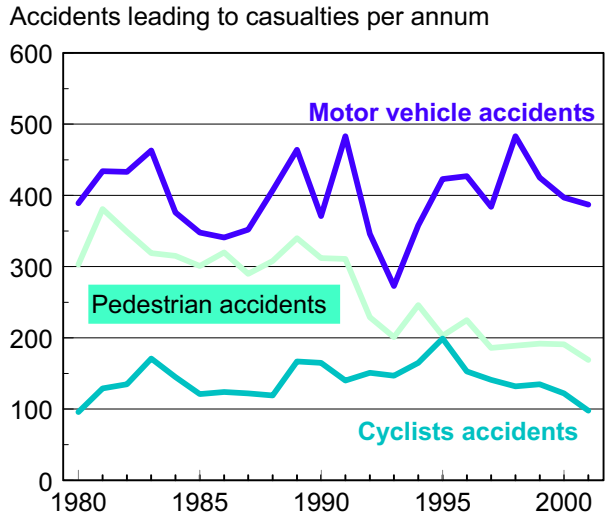


Source: Accident register of Helsinki City Planning Department's Traffic Planning division

8.6 Accidents involving pedestrians, cyclists and motorists

An average of 414 motor vehicle accidents, 185 pedestrian accidents and 118 bicycle accidents resulting in personal injury were recorded in the RIKI register in Helsinki each year between 1997 and 2001. On average, just one in five accidents resulting in personal injury is reported and recorded in the RIKI register.

Figure 8.5 Accidents in Helsinki resulting in personal injury by accident type 1980-2001.

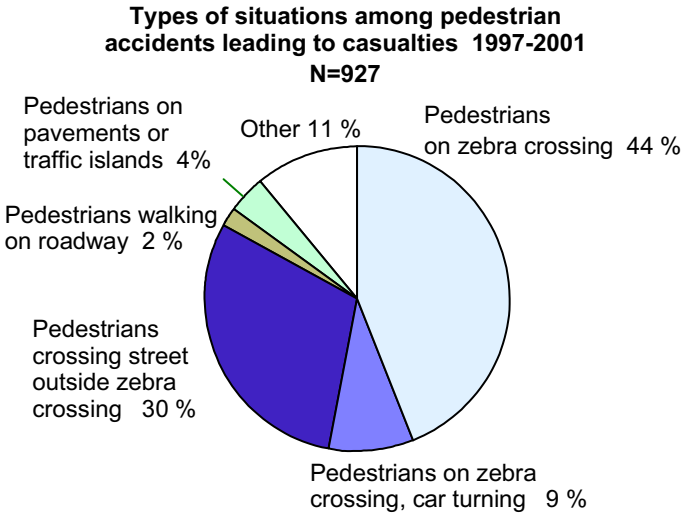


Source: Accident register of Helsinki City Planning Department's Traffic Planning division

Pedestrian accidents

In Helsinki, pedestrian accidents (40%) occur mainly on busy main and feeder roads in the inner city and 19 per cent on residential streets in the city as a whole. One in two pedestrian accidents occur when a pedestrian is crossing the road on a pedestrian crossing and one in three accidents occurs outside a pedestrian crossing.

Figure 8.6 Type of accident in pedestrian accidents resulting in personal injury in 1997-2001.

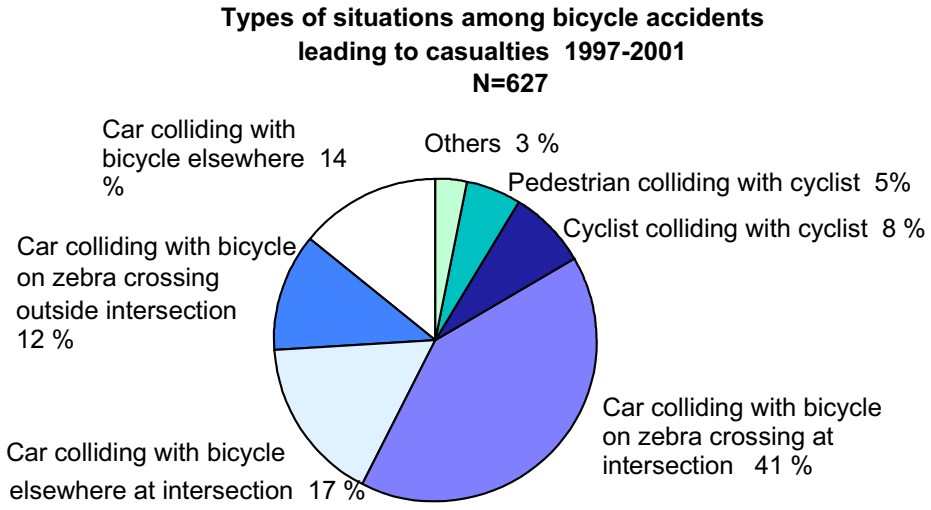


Source: Accident register of Helsinki City Planning Department's Traffic Planning division

Bicycle accidents

Most of the accidents recorded by the police are collisions between a cyclist and a vehicle on a road. Most accidents (70%) occur at road junctions, the most common spot (68%) at road junctions is a pedestrian crossing, in other words a continuation of the cycle path at a junction.

Figure 8.7 Type of accident in cycle accidents resulting in personal injuries 1997-2001.



Source: Accident register of Helsinki City Planning Department's Traffic Planning division

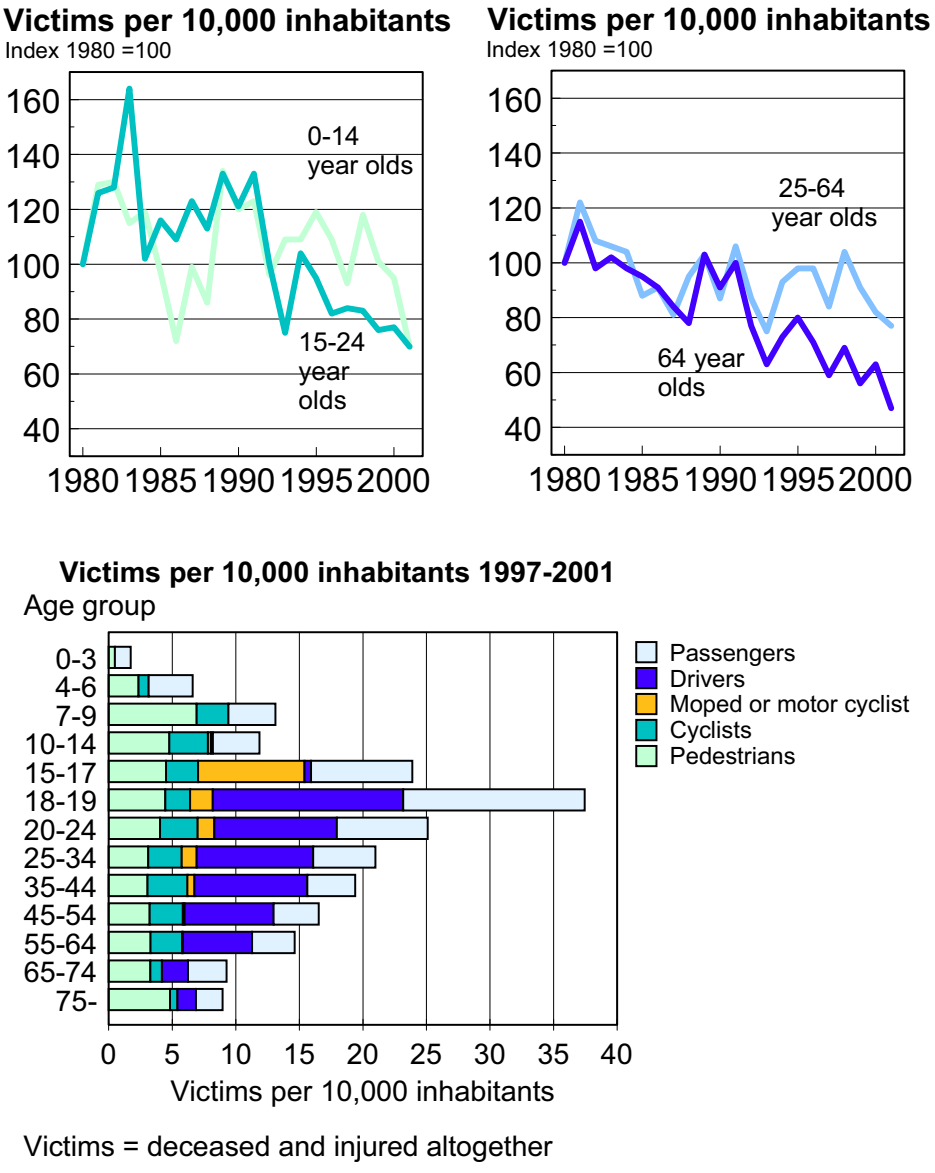
Motor vehicle accidents

Vehicle traffic is safest on motorways. The highest accident risk (personal injury per 100m kilometres driven) is on main roads in the inner city and busy feeder roads. The most common type of motor vehicle accident involving personal injury in the early 1980s was crossing accidents (34%). Today it is rear-end collision (32%).

8.7 Children, young people, adults of working age and senior citizens

The majority of road accident victims are adults of working age. In Helsinki, 68 children under the age of 15, 185 young people, 585 adults of working age and 68 senior citizens are injured or killed each year (1997 - 2001). Young people, small children and senior citizens pose the highest accident risk in Helsinki traffic. During their first years of school, children on foot are at a much greater risk of being involved in an accident than children of other ages. Senior citizens are at the greatest risk of being killed in a road accident.

Figure 8.8 Accident victims by age group per 10 000 residents, average in Helsinki 1997-2001.



Source: Accident register of Helsinki City Planning Department's Traffic Planning division, Helsinki City Urban Facts' Internet Service: Helsinki data from regional database

8.8 Vehicle safety

Cars are involved in most accidents resulting in personal injury in Helsinki. Between 1997 and 2001, cars were involved in 581, buses in 60 and trams in 23 accidents a year resulting in personal injury.

Cycling is by far the most dangerous form of transport given the number of kilometres cycled. Per passenger kilometre, buses cause least personal injury in Helsinki. Trams cause more than double and cars more than treble the number of victims compared to buses. Trams and buses are also safer for passengers and others, whereas cyclists cause more injuries to themselves than to others.

8.9 Accident statistics

Nowadays, road safety in Helsinki is monitored using the police crime register (RIKI) and Traffic Safety Committee of Finnish Insurance Companies data. In addition to the above, Helsinki also has access to the accident register kept by the traffic and special police at Helsinki Police Department.

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9. Transportation economics

9.1 Transport sector cash flow

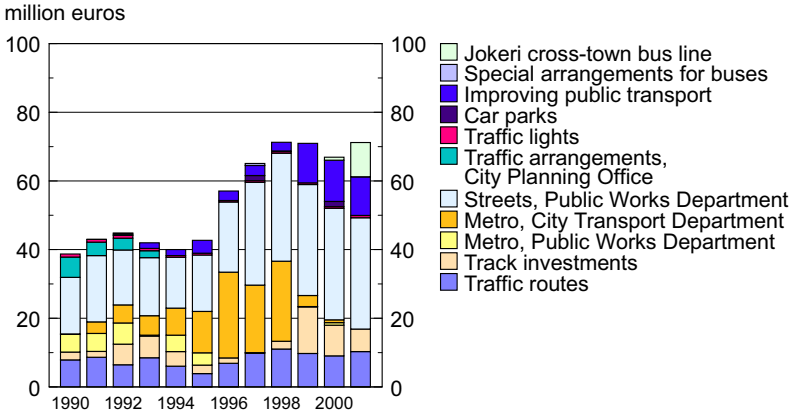
9.1.1 Transport investments and special taxes collected by the state in the Helsinki Metropolitan Area

In 2000, the government collected a total of €1 137 million from motorists in the Helsinki Metropolitan Area in various forms of taxes and other payments. The government spent €90 million of this figure for the benefit of transport in the area.

9.1.2 Transport investments in Helsinki

In 2001, Helsinki spent €63.1 million on building streets, traffic routes and tracks and on traffic schemes. An additional €35.8 million was spent on street and road maintenance and upkeep. Most of this expenditure was funded through local taxes.

Figure 9.1 Investment expenditure by transport sector in Helsinki 1990-2001.



Source: Helsinki City Planning Office's Traffic Planning division

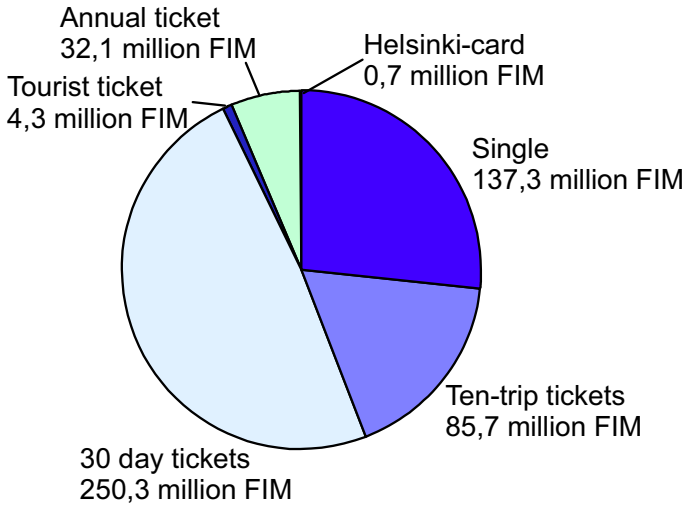
9.2 Public transport economics in Helsinki

Helsinki has fostered the use of public transport for decades by low cost fares. Fare revenue covers approximately half of the expenditure and the other half is subsidised from taxes. Fare revenues have risen since the first half of the 1990s as passenger numbers grew. However, last year saw this trend even out and the growth in fare revenue came to an end. In 2001, fare revenue totalled some €86 million.

Various efficiency measures such as putting out bus traffic to tender resulted in lower costs, which meant there was no need to increase fares between 1995 and 2001. In early 2002, the fares rose for the first time in seven years.

Staff costs account for around half of public transport expenditure. Cost structures differ greatly depending on mode of transport. The metro is the most capital intensive and bus traffic the most labour intensive in terms of expenditure structure. Investments in and maintenance of the basic structure (tracks, stations, stops and terminuses) swallow around a quarter of the public transport budget. Fleet acquisitions are also major expenditure items.

Figure 9.2 Fare revenues by ticket type 2001.



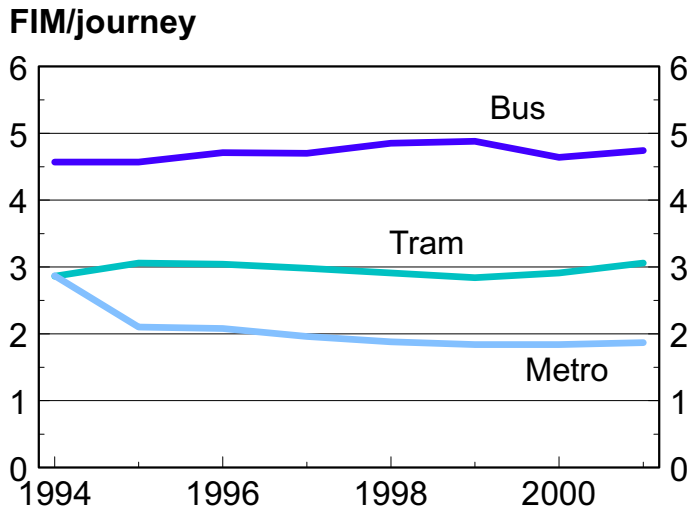
Source: Helsinki City Transport

The annual cost of running public transport in the Helsinki Metropolitan Area is around €99.95 million and fare revenue is some €67.35 million. The difference between expenditure and revenue is met by municipal contributions. Costs are divided by the number of journeys made by the inhabitants in each municipality. The cost of journeys made using regional tickets are divided between the municipalities on the basis of ticket type studies. In 2001, Helsinki's municipal contribution was around €6.39 million.

The Helsinki Metropolitan Area is divided into shared Helsinki, Espoo and Kauniainen and Vantaa fare zones along the lines of the municipal boundaries. Single zone journeys are journeys within one fare zone and cost the internal flat-rate fare de-

termined by each municipality. Journeys between two zones are those that cross a fare zone and are subject to a flat-rate regional fare.

Figure 9.3 Passenger kilometre cost by mode of transport 1994-2001.



Source: Helsinki City Transport

Various ticket pilot schemes have been tested and in 2002 the shift was made from cardboard season tickets to electronic travel cards. The first travel cards were introduced in autumn 2001. Since late 2001, it has been possible to use a mobile phone to pay for single tickets on trams and the metro. Tickets are also valid on the Suomenlinna ferries. The tram ticket, a low cost single ticket allowing no change of tram, has been a proven success since the mid-1990s. Group and family tickets were also introduced at the same time. The municipalities surrounding the Helsinki Metropolitan Area are working on several ticket cooperation pilots.

In 2001, ticket inspectors issued penalty fares to some 29 000 passengers. A total of 1.83 million tickets were inspected. Although some 2.2 per cent of passengers travel without a ticket, the percentage of passengers receiving a penalty fare is slightly lower at 1.56%. The past five years have seen a steady rise in the number of passengers travelling without a ticket.

9.3 Accident costs

Road accidents cause annual municipal costs of € 297 million (1997-2001) in Helsinki. This calculation is based on accident unit cost calculation principles approved by the Ministry of Transport and Communications. The costs include the economic losses sustained by the community and a so-called well-being loss. Economic costs are the loss of the victim's work input, medical treatment costs, administration costs of insurance companies, the police sickness insurance and the judicial system, funeral costs, loss of vehicle and other material losses. Calculation of the loss of well-being is

based on so-called individual willingness to pay. It is based on studies that have analysed people's willingness to make financial sacrifices to reduce the risk of accident.

Some € 223 million of the costs arise from injuries as a result of accidents, € 31 million from accidents resulting in death and € 45 million from accidents resulting in material damage. The unit costs used are € 2.4 million for a fatal accident, € 315 000 for an accident resulting in injury and € 17 000 for material damage.

9.4 How Helsinki inhabitants spend money on travel

Data about how inhabitants of Helsinki spend money on travel are based on consumer research carried out by Statistics Finland. In 1998, Helsinki households accounted for 13 per cent of all transport costs, compared to 8 per cent for the country as a whole. A Helsinki household spent a total of FIM 7 610 on short train, bus and taxi journeys, as well as transport services. The corresponding figure for a household in the country as a whole was FIM 3 520. FIM 1 580 was spent on short bus journeys and FIM 670 on taxi journeys per household in Helsinki. This compares with FIM 230 on taxi journeys and FIM 650 on short bus journeys per household for the country as a whole.

Helsinki inhabitants spent FIM 2 350 on road journeys. The corresponding figure for the country as a whole was FIM 980. Helsinki inhabitants also spent more money on tickets for foreign trips than the country as a whole, FIM 1 090 and FIM 570 respectively.

Helsinki inhabitants also spent more money on foreign package tours and cruises than Finland as a whole, FIM 1 880 compared to FIM 1 480. In 1998, Helsinki inhabitants spent FIM 1 590 on water transport, again more than inhabitants in the country as a whole.

9.5 Time spent travelling in the Helsinki Metropolitan Area

In 1999–2000, people spent 19 minutes a day, expressed in terms of average weekdays, on journeys to work. The figure was highest in comparisons between different major areas. In Finland as a whole, the comparative figure was 13 minutes and in North Finland 11 minutes.

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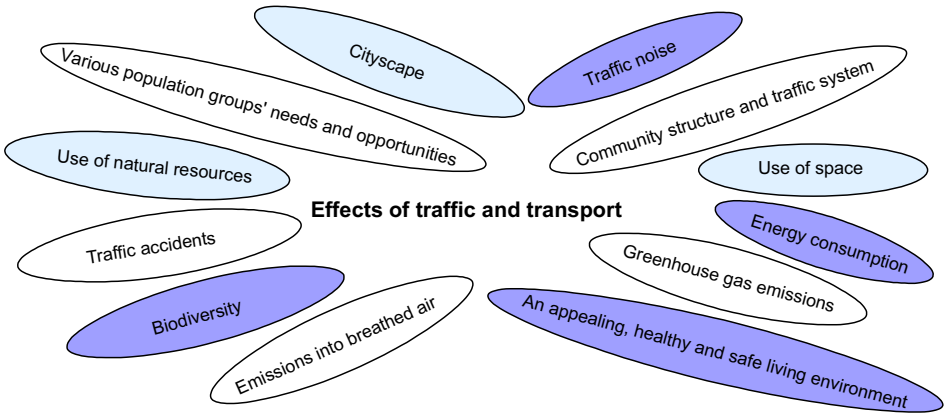
10. Environmental aspects of traffic

10.1 The impacts of transport and mobility

Mobility and traffic have many positive and negative impacts on the urban environment and everyday urban life. The entire traffic system has a major impact on social structure. Traffic volume, efficiency, use of space and the modal division of transport affect the health, safety and enjoyment of the environment in which we live. Traffic consumes energy, gives rise to noise and hazardous emissions and causes accidents.

Figure 10.1 The impacts of traffic and mobility.



Source: Helsinki City Environment Centre

10.2 Emissions from different modes of transport in urban traffic

Traffic emissions are a major factor affecting local air quality. Oxides of nitrogen and particulate emissions currently pose the worst health problem. Carbon dioxide is a greenhouse gas that leads to climate change. There is a direct correlation between carbon dioxide emissions from vehicles and energy consumption.

10.2.1 Source data

The primary source of data used was from LIPASTO 2000, a calculation system for traffic exhaust gas emissions and energy consumption in Finland developed by the Technical Research Centre of Finland (VTT). The system contains unit emission figures and energy consumption coefficients for different modes of transport in Finland.

10.2.2 Passenger cars

At year-end 2001, the average age of passenger cars in the Helsinki Metropolitan Area was 8.1 years. Catalytic converters became compulsory for all new petrol driven cars in 1990. In 2001, around 53 per cent of cars in Finland had a catalytic converter. The figure for the Helsinki Metropolitan Area is higher than that for the country as a whole.

Cars account for 80-90 per cent of carbon monoxide and hydrocarbon emissions in the Helsinki Metropolitan Area and for around 50 per cent of oxides of nitrogen emissions. Huge differences in urban driving conditions add to fuel consumption and emissions. Vehicle fuel consumption is some 60 per cent higher when driving in built up areas than when driving on main roads.

Table 10.1 Estimated vehicular emissions per person kilometre (g/pp/km) in urban driving.

	CO	HC	NOx	PM	CO_2
Average car in 2000, petrol (1,2 persons)	8,7	1,3	0,88	0,015	159
Car EURO 2 petrol (1,2 persons)	1,7	0,5	0,21	0,006	151
Average car in 2000 diesel (1,2 persons)	0,52	0,15	0,81	0,23	144
Car EURO 2 diesel (1,2 persons)	0,42	0,11	0,74	0,17	144
Average city bus in 2000 (18 passengers)	0,42	0,14	0,81	0,04	70
City bus EURO 2 diesel (18 passengers)	0,17	0,1	0,63	0,018	68
Tram (21 passengers)	0,03	0,004	0,09	0,008	57
Commuter train (70 passengers)	0,02	0,003	0,06	0,007	32
Metro (100 passengers per pair of wagons)	0,008	0,001	0,02	0,004	13

CO = carbon monoxide, HC = hydrocarbons, NOx = nitrogen oxides, PM = exhaust particles total, CO_2 = carbon dioxide.

Source: LIPASTO 2000, Mäkelä 2002, Helsinki City Transport Deparment.

The average fuel consumption and carbon dioxide emissions from new petrol powered cars fell by 8 per cent between 1993 and 2000. The corresponding figure for diesel cars was 23 per cent.

Petrol powered cars have different exhaust gas emissions to diesel powered ones. Each litre of petrol consumed gives rise to 2 350 g of carbon dioxide compared to 2 660 g per litre of diesel. However, diesel cars consume less fuel and thus give rise to slightly less carbon dioxide exhaust gas emissions than petrol powered cars per journey made.

Catalytic converters and improved fuels have cut carbon monoxide, hydrocarbon and oxides of nitrogen emissions from petrol driven cars. Advances in vehicle technology and fuels (low sulphur diesel) have also led to a decline in exhaust gas emissions from diesel cars, although these produce more particulate and oxides of nitrogen emissions than petrol powered cars do.

10.2.3 City buses

It is estimated that buses account for a maximum of 10-15 per cent of exhaust gas emissions in the Helsinki Metropolitan Area. There is still very little information about exhaust gas emissions from diesel powered city buses. Automatic drive, introduced to improve driver comfort, results in higher fuel consumption and thus greater emissions. Calculations show that the use of natural gas and liquefied gas have led to a major fall in oxides of nitrogen (-60%) and particulate emissions (-85%) compared to 1997. However, use of gas as a fuel has resulted in a sharp rise in hydrocarbon emissions (including methane). Switching over to the use of natural gas powered buses can lead to lower oxides of nitrogen and particulate emissions in bus traffic. April 2002 saw the introduction of new gas powered buses to replace 15-year-old diesel buses on routes in the centre of Helsinki. Compared to the diesel buses withdrawn from service, it is estimated that the natural gas buses will cut oxides of nitrogen emissions by almost 80 per cent and particulate emissions by around 90 per cent (Helsinki City Transport 2002).

10.2.4 Rail traffic

Emissions arising from the production of electricity used by rail traffic are thought to account for a very minor share, 2 per cent maximum, of overall traffic emissions in the Helsinki Metropolitan Area. The metro is the most energy efficient form of rail traffic in Helsinki and gives rise to very small emissions per passenger.

10.2.5 Goods traffic

Diesel powered goods traffic is a much more serious problem as far as emissions and air quality are concerned and is thought to account for around 40 per cent of oxides of nitrogen emissions and over half of the particulate emissions in the Helsinki Metropolitan Area. It is believed that goods traffic will account for an increasing amount of emissions whilst passenger car emissions will fall.

10.2.6 Mopeds and motorcycles

It is thought that mopeds and motorcycles produce much hydrocarbon and carbon monoxide emissions in particular. These emissions occur especially when accelerating, driving slowly or driving in stops and starts and pose a health risk.

10.2.7 Walking and cycling

Instead of driving short distances, when a car engine doesn't really have time to warm up properly and the catalytic converter isn't fully effective, it's worth encouraging walking and cycling to cut exhaust gas emissions.

10.2.8 Comparison of modes of transport

Motor vehicle exhaust gas emissions, especially those from goods traffic and passenger cars, cause the greatest adverse environmental impact caused by traffic.

The metro, local commuter trains and trams are energy-efficient forms of transport. Switching over to natural gas buses can decrease particulate and oxides of nitrogen emissions, especially compared with existing diesel buses.

The adverse impacts attributable to vehicle emissions depend, among other things, on emission height. Emissions from motor vehicle traffic are discharged straight into the air we breathe and have a major effect on local air quality. The emissions arising from producing the energy used by rail traffic are discharged from high smokestacks spread over a wide area and thus become diluted, alleviating their impacts at the same time.

10.3 Impacts of traffic on air quality

10.3.1 Impurities caused by traffic

Most of the various impurities produced by traffic originate from passenger cars and goods traffic, with public transport accounting for a maximum of 10-15 per cent. Additionally, air currents from traffic cause street dust particles to rise in the streets. The impact of other sources – energy production, industry, particles carried long distances – on air quality is either less, local or sporadic, as is the impact of shipping and air traffic. The use of unleaded petrol has resulted in a complete elimination of lead emissions from exhaust gases. Carbon dioxide on the other hand is the end product of fully combusted fuel and whilst not harmful outdoors, it is the principal greenhouse gas. The amount of carbon dioxide can only be reduced by cutting fuel consumption and by using public transport, especially rail traffic.

10.3.2 Air quality measurement

The Environmental Office of Helsinki Metropolitan Area Council (YTV) continuously measures air quality at measuring stations in Töölö, Vallila and Kallio. Air

quality guidelines and limit values are provided in Government decisions (480/96 and 480/91) and in the Decree on Air Quality (711/2001). These values are based on international health effect studies. Air quality guidelines are national and indicative by nature. They express the aims of air quality management and should be taken into account in urban planning, for example. The guidelines should not be exceeded and air quality better than that referred to in the guidelines should not deteriorate. Limit values are binding and must not be exceeded in the long-term. New, stricter EU limit values entered into force in 2001 and will be gradually met by 2010.

10.3.3 Air quality development in the 1990s

Traffic changes particularly affected the quality of air in the 1990s. Traffic volumes have risen sharply since the decline as a result of the recession in the early 1990s. At the same time, however, better fuels and cleaning technology have had a positive impact on traffic-derived impurities.

Improved fuels and catalytic converters have resulted in lower carbon monoxide concentrations, which are well below the guidelines and limit values. Catalytic converters have led to a marked fall in nitrogen monoxide concentration, although at times nitrogen oxide concentration exceeds 24-hour guidelines especially during periods of heavy traffic. Ozone is carried by the wind to the Helsinki Metropolitan Area from Central Europe, where it is formed by oxides of nitrogen reacting with hydrocarbons.

There is little ozone formation in the Finnish climate and what little there is can at times be used up when it reacts with nitrogen monoxide in congested environments. The mean ozone concentration in the Helsinki Metropolitan Area rose during the 1990s. The concentration of suspended dust particles or total suspended particulates declined during the 1980s and 1990s and is currently well below the annual limit value of 150 mg/m^3. This is because of better quality grit, more efficient removal of street dust and lower particulate emissions in energy production. Nevertheless, total suspended particulate guidelines are still exceeded in Töölö on both a yearly and daily basis.

However, 24-hour concentrations exceed guidelines and approach the 24-hour limit value especially during the removal of grit from the streets in late winter and early spring. Roughly one third of particulate matter is street dust.

Lead concentrations in the air fell during the 1990s as a result of unleaded petrol. The air quality index has been used since 1994 in information about air quality. Air quality was satisfactory on most days between 1994 and 2001.

10.3.4 Air quality today

Average concentrations of most impurities in the air declined during the 1990s and air quality today is mostly satisfactory. Current impurities in the air are particulate matter (PM_{10}), small particulate matter ($PM_{2.5}$), nitrogen dioxide (NO_2) and ozone (O_3), which are problematic at certain times and in certain places. Nitrogen dioxide and particulate matter are impurities caused by traffic. High ozone concentrations are during the spring and summer months.

In our climate, the traffic environment acts as an ozone sequester, when ozone reacts with the nitrogen monoxide in exhaust gases and even uses it up.

Concentrations of impurities derived from traffic vary greatly depending on traffic volume, the share of heavy traffic, congestion, speed, weather and wind conditions. The air is cleanest at night and on Sundays in July and during the autumn and worst during weekday rush hours in winter and spring. Wind and precipitation efficiently clean the air.

Table 10.2 Daily value of air quality index in Helsinki 1994-2001.

	Good		Satisfactory		Passable		Bad	
Year	Helsinki	HMA*	Helsinki	HMA*	Helsinki	HMA*	Helsinki	HMA*
1994	11	46	297	303	52	16	5	0
1995	11	29	301	318	46	14	7	4
1996	21	47	299	287	38	26	8	6
1997	19	40	323	317	23	8	0	0
1998	20	27	299	315	43	20	3	3
1999	27	29	323	326	15	10	0	0
2000	29	42	324	312	12	11	0	1
2001	16	26	336	316	12	20	1	3

*HMA = Helsinki Metropolitan Area

Source: Helsinki Metropolitan Area Council YTV, Environmental Bureau

The hourly limit of 200 mg/m^3 for nitrogen dioxide (if the situation continues for more than 18 hours) can be exceeded in situations of inversion, which occur particularly on clear, cold mornings. In the event of this, in 1998 Helsinki drew up a plan of readiness recommending that private motoring be avoided and later gradually restricting the use of private motoring. In 1999, Helsinki drew up a plan of action to combat acute street dust. Under the plan, the City of Helsinki Public Works Department will wet the streets if dust concentration becomes too high and if the weather forecast suggests the situation is unlikely to improve.

As far as air quality is concerned, the worst areas in Helsinki are poorly aired, congested street corridors and the vicinity of major arterial roads, where concentrations of nitrogen dioxide and particulate matter can consistently exceed guidelines and can, according to calculation model estimates, also exceed limit values.

Air quality is worst at the lower strata level and improves with height.

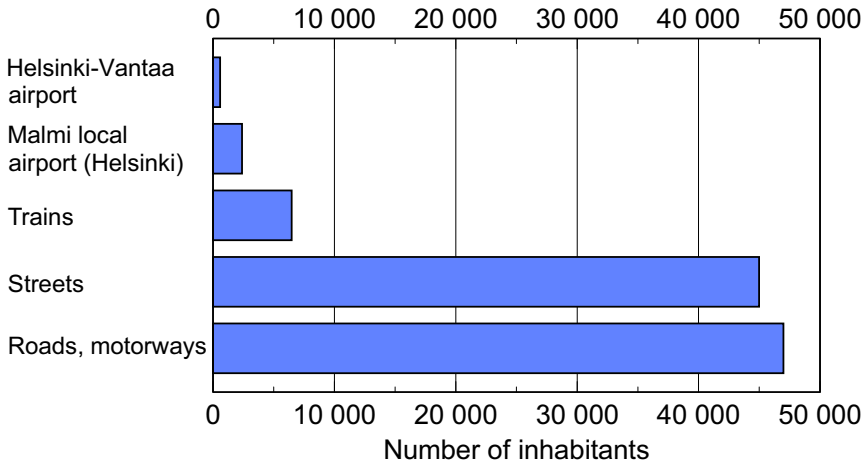
10.3.5 Future trend of air quality

Recent decades have seen an improvement in air quality, a trend that, despite an anticipated sharp increase in traffic, is expected to continue because vehicle emissions are declining at the same time. Nevertheless, guidelines for nitrogen dioxide and particulate matter may be exceeded locally in future along main roads and ring roads and in inner city street corridors.

10.4 Traffic noise

Noise has become a growing environmental problem. The problem of noise has been further exacerbated by an increasingly compact urban structure and the dynamic rise in vehicular traffic.

Figure 10.2 Number of inhabitants in noise areas in Helsinki in 2001, by mode of transport.



Source: Helsinki City Environment Centre

10.4.1 Noise abatement legislation

The main general noise abatement provisions and principles are included in the Environmental Protection Act, which, when it entered into force in 2002, replaced the Noise Abatement Act. The Act highlights preventative action and the minimisation of adverse impacts.

10.4.2 Noise situation

The noise situation in Helsinki has been monitored since way back in the early 1970s. The first areas studied were those where noise exceeded 64 dB(A). In 1990, the Ministry of the Environment issued guidelines for arrangements to monitor the noise situation in municipalities These guidelines divided noise zones into areas with levels of 55, 60 and over 65 dB(A). Areas with noise levels exceeding 55 dB(A) then began to be considered as noise areas. The same zoning scheme is still in use today.

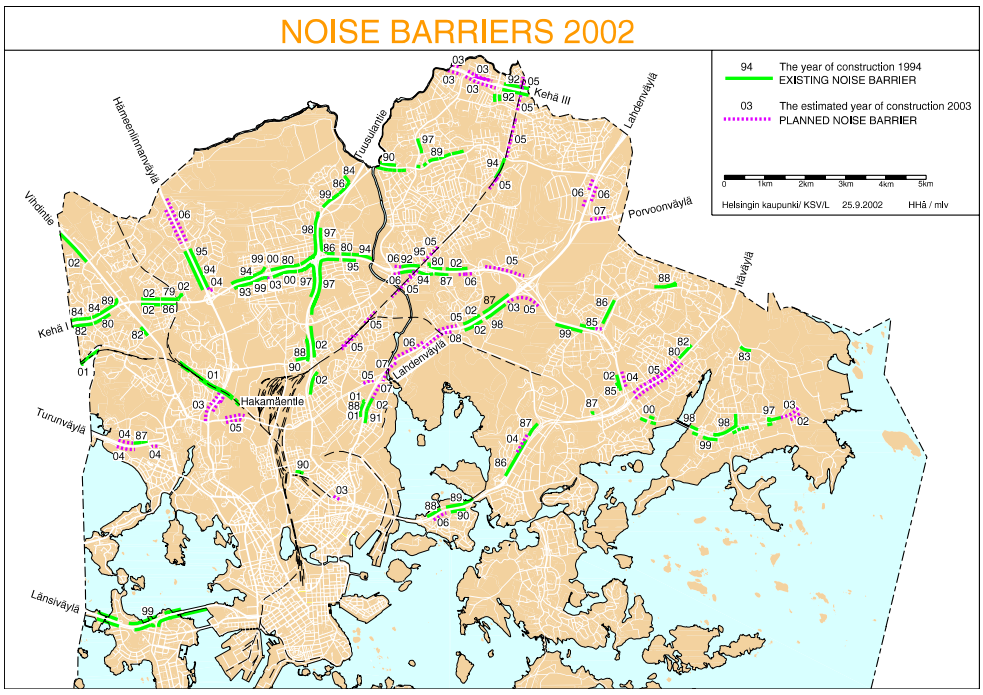
Road traffic is the greatest cause of noise problems today. In 1980, around 88 000 Helsinki inhabitants lived in noise areas exceeding 55 dB(A). In 1993, the figure was 120 000. The latest estimate for 2000 put the figure at 92 000 Helsinki inhabitants living in a noise area exceeding 55 dB(A). Of this figure, 47 000 lived near public roads and 45 000 in streets.

Finland's busiest stretches of railway track - the main line to the North and the so-called coast line towards Turku in the west - are in Helsinki. A study carried out in 1992 showed that 6 300 Helsinki inhabitants lived in an area with railway traffic noise. In 2001, it was thought 6 500 inhabitants were subject to train noise. The noise areas of Helsinki-Vantaa Airport and Helsinki-Malmi Airfield extend to the Helsinki area. The noise area of Helsinki-Vantaa Airport extends to the northern parts of Helsinki. In 1990, there were 26 700 Helsinki inhabitants living in the noise area. This figure had fallen to 4 700 in 1994 and the corresponding figure in 2000 was around 600. Changed flight routes, which are advantageous to Helsinki, and stricter aircraft noise regulations are the reason for this fall in the number of inhabitants subject to the airport noise.

10.4.3. Noise abatement methods

Prevention is the watchword in noise abatement. Noise problems can be prevented or existing problems alleviated through zoning and traffic planning. Some stretches of streets can be designated as no through roads or otherwise subject to limits. Banning heavy vehicles from certain roads is particularly effective. Lower speed limits also reduce noise levels. Heavy goods vehicles have been banned from the centre of Helsinki since 1991. Additionally night driving is prohibited on some streets. Helsinki makes an annual noise barrier construction programme based on the budget confirmed by the city council and on the economic plan. The programme includes projects to be carried out by the city itself and those in cooperation with Uusimaa Road District. By the beginning of 1999, Helsinki had built 36.6 km of noise barriers.

Map 10.1 Existing and planned noise barriers in Helsinki.



Source: YTV Helsinki Metropolitan Area Council, Traffic division

10.4.4 Future noise trends

Forecasts suggest that noise areas from street and road traffic will expand until 2020 at the latest, subjecting increasingly more people to noise. This is the outcome of the dynamic growth in traffic, especially along transverse routes. It is thought noise problems from air and railway traffic will decrease.

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11. Communications

11.1 Social changes

The internet and electronic communications pave the way for new work practices and increase flexibility at work, in studies, using services and during leisure time.

The urban structure also reflects the changes ushered in by information and communication technology (ICT). The borders between work, home and leisure have become increasingly blurred. Computer work neither pollutes nor makes a noise and generally requires very little physical space. Tele-working and e-commerce, for example, create new potential and needs for mobility.

Increasingly widespread Tele-working and flexible working hours affect people's daily mobility. If we work at home, regular commutes are likely to turn into various errands and leisure journeys at some stage during the day.

Telecommunications links make it possible to obtain information and goods and use services irrespective of time and place. These links can be used to deal with banking matters, shop online, order tickets or book journeys. Use of the internet is not limited to essentials, but also acts as a source of information for diverse hobbies and leisure time activities. Library facilities, listening to music, discussion groups, games and dating are just some of the diverse range of services available online. Internet and email users are also socially active since online meetings are both simple and convenient to arrange even among larger groups.

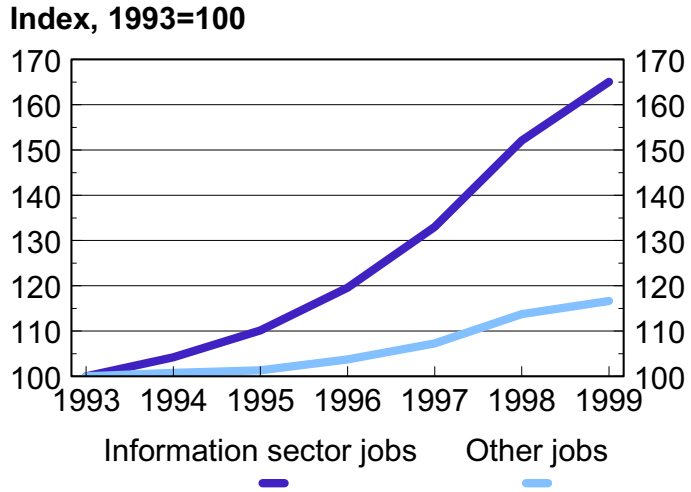
Alternative work practices undoubtedly affect people's mobility. Telecommunications links seem to complement and support traditional forms of mobility. Although there are many possibilities, telecommunications links are neither displacing the need for physical mobility nor the importance of personal contact. Traffic and communications volumes have grown at the same rate ever since the telephone was invented, neither has the growth in air traffic halted the setting up of video conferences.

11.2 Helsinki – an information industry cluster

Both transport and communications connections will continue to be one of the basic requirements for a vibrant city. In the Helsinki Metropolitan Area, a highly educated population, high incomes, compact urban structure and the large number of busines-

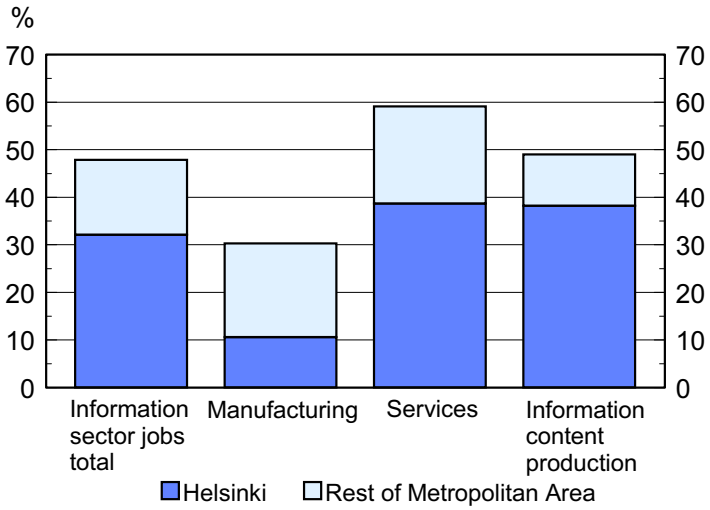
ses, especially those in the information industry, contribute to the demand and supply of all communications connections.

Figure 11.1 Jobs in Helsinki in the information industry and other industries 1993-1999 (index, 1993=100).



Source: Helsinki City IMC (Information Management Centre)

Figure 11.2 Shares of the Helsinki Metropolitan Area and Helsinki of all jobs in Finland's information industry in 2000.



Source: Statistics Finland's urban and regional indicators

The Finnish information industry is strongly focused on Helsinki and the Helsinki Metropolitan Area and without doubt played a part in the economic growth of Helsinki and in the increase in jobs in the 1990s. The use of information and communication technology (ICT) is closely associated with the information industry, even though the

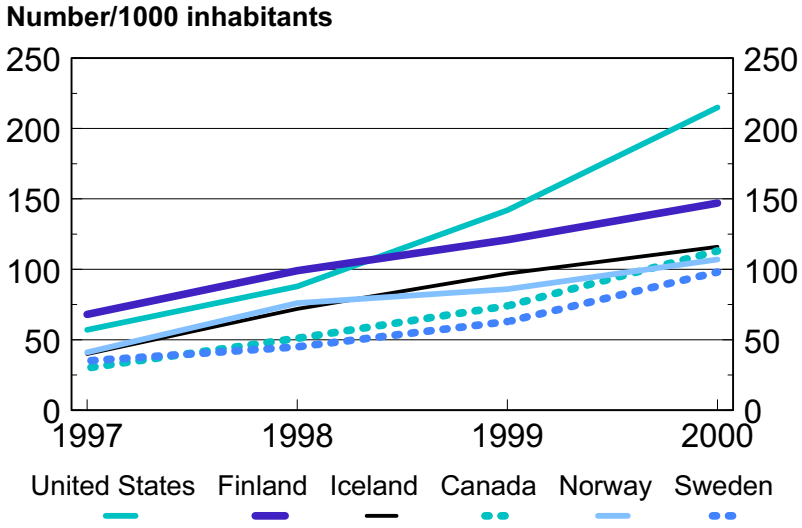
telecommunications sector proper is considered as just one part of the information industry. The information industry has grown much faster than other industries, accounting for 13 per cent of jobs in Helsinki in 1993. Subsequently the industry has accounted for a third of all industrial growth. In 1999, IT accounted for 17 per cent of jobs in Helsinki, compared to 9 per cent for the country as a whole. At year-end 1999, Espoo had the highest share, 25 per cent, of jobs in the IT industry. In Oulu the corresponding figure was 18 per cent, in Tampere 14 per cent and in Turku 9 per cent.

The Helsinki Metropolitan Area is home to almost half the jobs in Finland's content and service provision sectors. At under 30 per cent, the share of IT-related goods production is markedly much smaller. The distribution of various sectors within the IT industry in Helsinki is very similar to that in the Helsinki Metropolitan Area as a whole. Helsinki is home to a fifth of the jobs in content and service provision.

11.3 ICT hardware as indicators of development

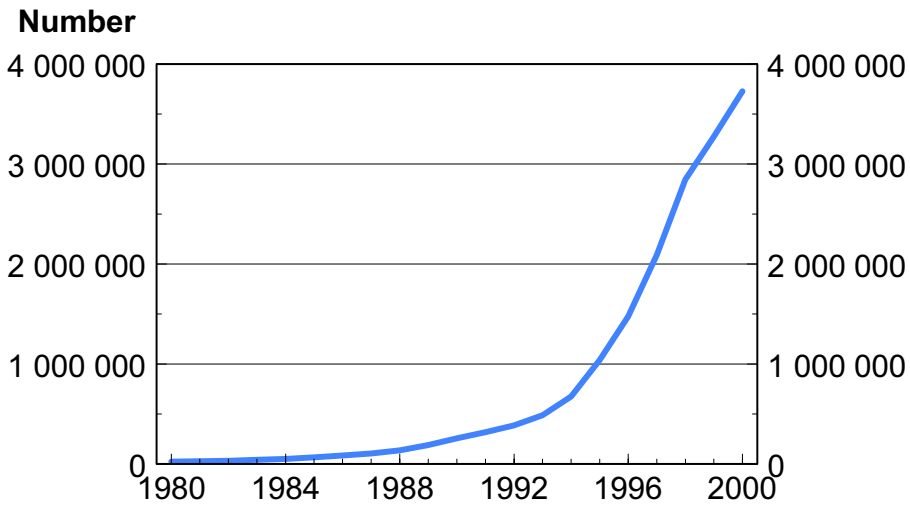
The use and amount of ICT hardware – mobile phones, computers and internet subscriptions – are often used as indicators to measure the technological development of society. According to OECD benchmark information in 2000, Finland ranked second in global internet server penetration per capita, with 147 servers for every 1000 inhabitants. The United States overtook Finland in late 1998, since when it has also increased its lead on other countries. The mobile phone has an unassailable position in comparisons of Finnish ICT hardware. Over 90 per cent of Finnish households already have a mobile phone and the number of households seems to have stabilised at this level. In this respect, there are no major differences between the Helsinki Metropolitan Area and the rest of the country.

Figure 11.3 Number of host computers connected to the internet per 1000 inhabitants 1997-2000.



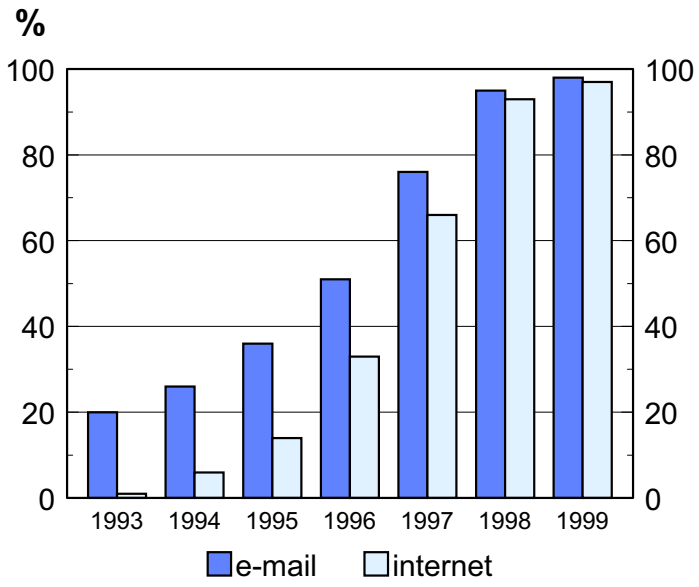
Source: Statistics Finland. Science, Technology- and Research

Figure 11.4 Total number of mobile phone subscriptions in Finland 1980-2000.



Source: The Ministry of Transport and Communications

Figure 11.5 Share of Helsinki firms of at least 20 employees using e-mail and the internet 1993-1999.



Source: Helsinki City Information Management Centre

11.4 Communications infrastructure in Helsinki

Generally speaking, Helsinki has a good, technologically advanced communications infrastructure. Compact dwelling, innovative business, an educated population and a high level of income have all contributed to the building of advanced communication networks in the city. In many districts there is a choice between different technologies (wired connections including telephone, cable TV and the electricity grid and wireless such as mobile phone, radio and satellite connections).

Helsinki is not responsible for building communications networks, this is done by telecom operators and the private sector (including Elisa and TeliaSonera). Finland has spearheaded deregulation of the telecommunications business. As for building communications networks, the city of Helsinki, too, seeks to be neutral on both the competitive and technological fronts. For competitive reasons, companies are hardly likely to want to reveal the coverage of their communications networks.

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12. Transport habits

12.1 Background

There are numerous factors - stage of life, level of income, job and transport links - that affect people's transport habits. Transport studies have been conducted in the Helsinki Metropolitan Area for traffic planning purposes. In autumn 2000, the Helsinki Metropolitan Area Council (YTV) commissioned an interview survey on the modes of transport residents in the region use. The study ascertained the transport habits of almost 8,700 residents in the Helsinki Metropolitan Area during a normal working day and collected data about 28,000 journeys.

12.2 Factors affecting transport habits

Car ownership has a major impact on the way people travel. In turn, household size, stage of life, level of income and local transport affect car ownership or use of a car. In 2000, at least 59 per cent of households in the Helsinki Metropolitan Area had at least one car, 11 per cent had at least two cars and 41 per cent did not own a car. Households not owning a car formed a majority, 59 per cent, in the inner city of Helsinki, 26 per cent of households in Espoo and Kauniainen didn't own a car and 30 per cent in Vantaa. Households with cars were larger than average and 72 per cent of the population studied belonged to households that owned a car.

Private households had the use of 320 000 registered cars, an average of 345 cars per 1000 inhabitants. Least cars were in the inner city of Helsinki, which had 280 cars per 1 000 inhabitants. Espoo and Kauniainen showed the highest figures with over 400 cars per 1 000 inhabitants. Car penetration in Helsinki averaged 313 vehicles per 1 000 inhabitants. Persons living in Espoo and Kauniainen had relatively more company cars. Inhabitants in the Helsinki Metropolitan Area had 44 000 company cars, corresponding to 14 per cent of all passenger cars. In 1988, prior to the recession, the figure was 18 per cent and in 1995 just 13 per cent.

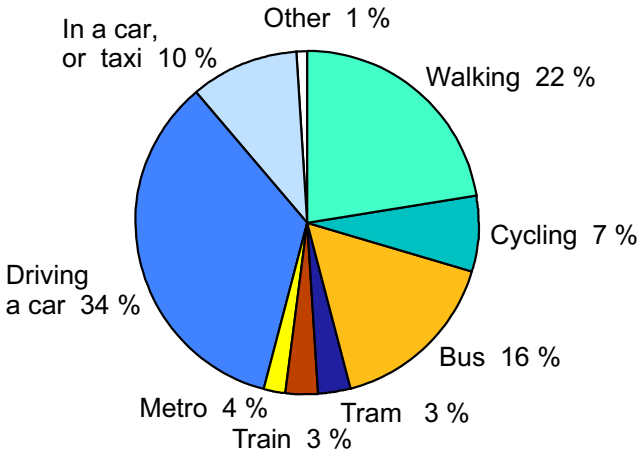
In the Helsinki Metropolitan Area, 77 per cent of persons over the age of 18 had a driving licence. Almost as many young women as young men had a driving licence, although in the older age groups considerably more men had a driving licence.

Taking the region as a whole, 69 per cent had some kind of public transport ticket. There were relatively fewer people without a ticket in Helsinki. An average eight per cent had more than one type of ticket.

12.3 Daily journeys

Inhabitants in the Helsinki Metropolitan Area made 3.1 million journeys on an ordinary weekday in autumn 2000. This figure also includes journeys to destinations outside the area. Almost 30 per cent of journeys were made on foot or by cycle. Public transport accounted for 27 per cent of these journeys and cars for 44 per cent. When only journeys within the area by car are considered, public transport accounted for 39 per cent of trips.

Figure 12.1 Journeys by mode of transport in the Helsinki Metropolitan Area in 2000 (journeys/weekday).



Source: Liikkumistottumukset ja niiden muutokset pääkaupunkiseudulla vuonna 2000. Publication series of the Helsinki Metropolitan Area Council YTV C 2002:11.

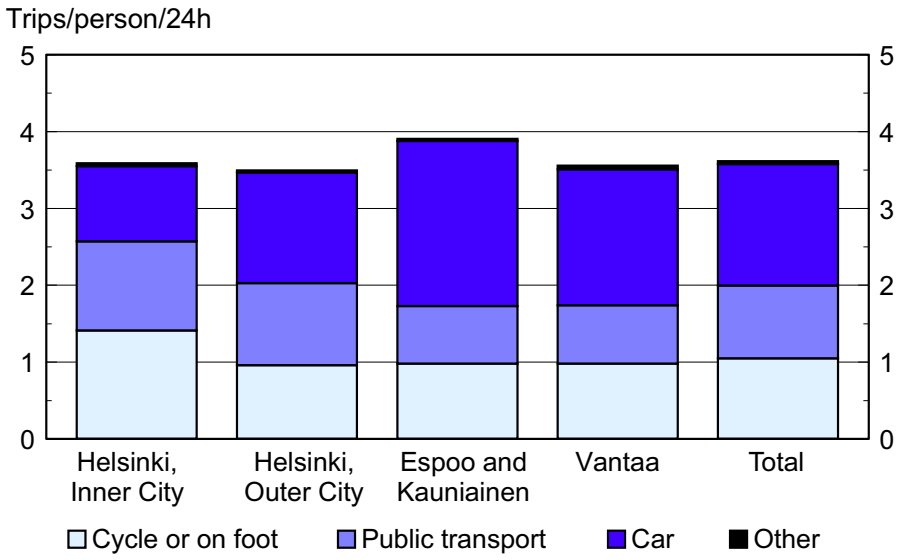
People living in the inner city of Helsinki used public transport for almost two thirds of journeys made within the inner city and for at least half of the journeys between the inner city and other places in the Helsinki Metropolitan Area. In transverse journeys and stretches outside the area, public transport generally accounts for just 20 per cent. The smallest share was in journeys between Espoo and Vantaa. Over 80 per cent of all journeys were home related, in other words they either began or ended at home. Commuting from home to work accounted for 22 per cent of journeys (23% in 1995 and 30% in 1988). The largest travel category was “other trip from home”.

Public transport accounts for a fairly large share of school journeys and commuting. Use of a car was most common in the case of journeys other than those relating to home.

An average of 3.6 journeys per person per day were made. Persons living in Espoo and Kauniainen were the most mobile and also used their cars the most. The differen-

ces between areas were similar to those noted earlier. Persons living in the inner city of Helsinki were the heaviest users of public and light transport. Inhabitants of Espoo and Vantaa used public and light transport almost equally to get around.

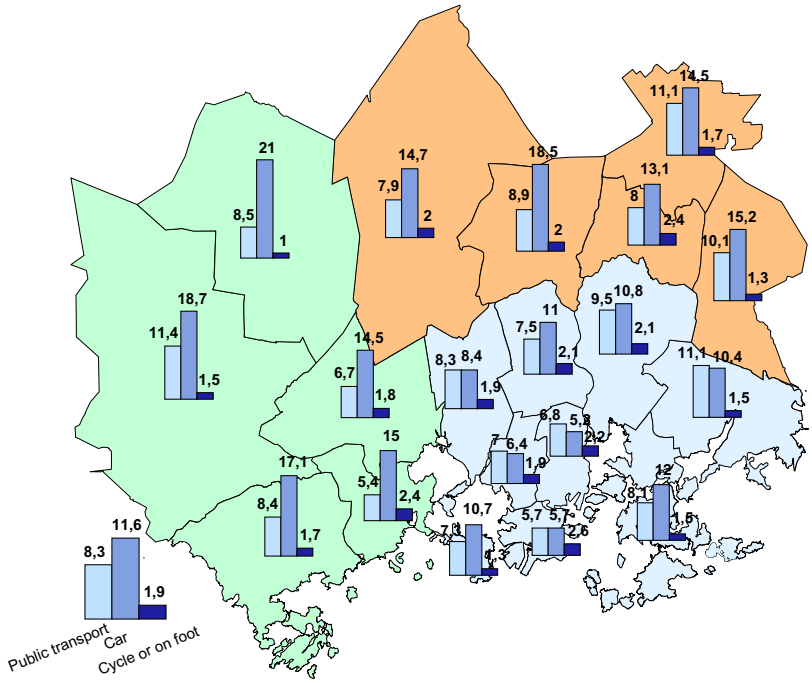
Figure 12.2 Journeys per person per day by residential area and mode of transport in 2000.



Source: Liikkumistottumukset ja niiden muutokset pääkaupunkiseudulla vuonna 2000. Publication series of the Helsinki Metropolitan Area Council YTV C 2002:11.

Men and women made a similar number of journeys, although there was a marked difference in the form of transport used. Men of all age groups used a car considerably more than women. Similarly, women used public transport more than men. In most age groups more women than men walk or cycle.

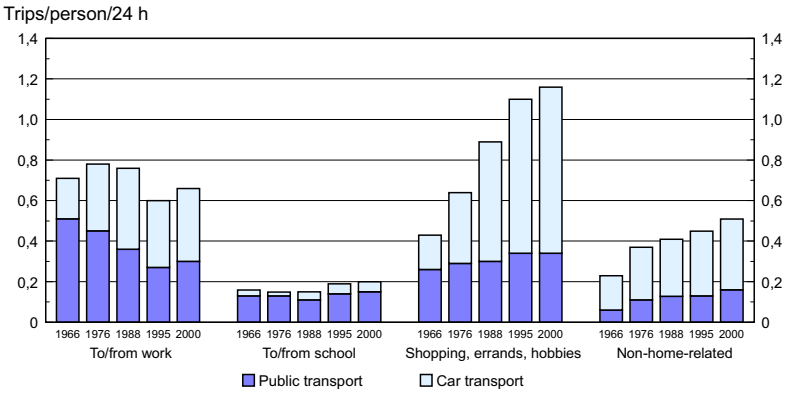
Figure 12.3 Daily journey made in the Helsinki Metropolitan Area by residential area in 2000 (km per person).



Source: Liikkumistottumukset ja niiden muutokset pääkaupunkiseudulla vuonna 2000. Publication series of the Helsinki Metropolitan Area Council YTV C 2002:11.

Inhabitants in the Helsinki Metropolitan Area travel an average of 22 km within the area on a normal weekday. Men travel more than women (24 km and 20 km) and men travel almost twice as far by car than women do. If the modal split of a journey is calculated, public transport accounts for 38 per cent, car transport 53 per cent and light transport 9 per cent. Public transport accounts for a total of almost 42 per cent of the car or public transport vehicle mileage.

Figure 12.4 Number of journeys a day per inhabitant by purpose of journey 1966-2000.



Source: Liikkumistottumukset ja niiden muutokset pääkaupunkiseudulla vuonna 2000. Publication series of the Helsinki Metropolitan Area Council YTV C 2002:11.

Persons living in the inner city of Helsinki are the least mobile and only daily drive a car for a third of the distance driven by inhabitants on the outskirts of the Helsinki Metropolitan Area. Inhabitants of the Helsinki Metropolitan Area spent an average of 1 hour 20 minutes travelling each day.

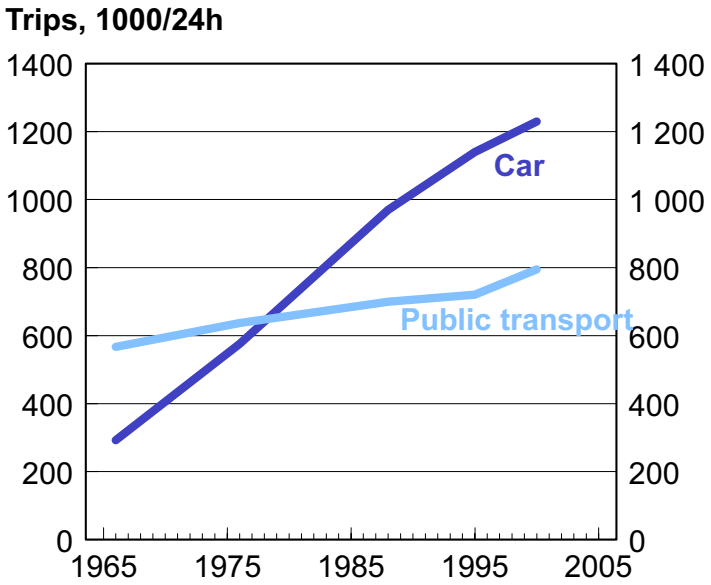
There was no difference between men and women in the time spent travelling. A single journey took an average of 22 minutes. Journeys by public transport took the most time, an average of 32 minutes.

12.4 Changes in transport habits 1966–2000

Extensive transport surveys were conducted in the Helsinki Metropolitan Area in 1966, 1976 and 1988. All of these surveys included the transport habits of people in the area.

The population in the area has risen by almost 50 per cent since the mid-1960s and the number of cars in use by private households has risen four-fold over the same period. The population of the inner city of Helsinki has fallen by a third since the mid-1960s. At the same time, the populations of Espoo, Kauniainen and Vantaa have tripled.

Figure 12.5 Journeys made by public transport and car within the Helsinki Metropolitan Area 1966-2000.



Source: Liikkumistottumukset ja niiden muutokset pääkaupunkiseudulla vuonna 2000. Publication series of the Helsinki Metropolitan Area Council YTV C 2002:11.

In the mid-1960s, the inner city of Helsinki was home to almost 75 per cent of the jobs in the Helsinki Metropolitan Area, compared to less than 40 per cent today. The number of jobs in the Helsinki suburbs has almost tripled and in Espoo, Kauniainen and Espoo has grown by 5-6 fold in 35 years.

Car ownership has increased and housing has become more dispersed as incomes have risen. As the car stock has grown, the number of car journeys made in the area has quadrupled since the mid-1960s. Over the same period, the number of journeys made by public transport has risen by 40 per cent or more slowly than population growth. The share of public transport of journeys made by motor vehicle within the Helsinki Metropolitan Area has fallen from two thirds to 39 per cent. Relatively, public transport is most used for commuting and school journeys. After the mid-1990s, it seems the long decline in the share of public transport of modal transport has stopped. There are several reasons for this: successful efforts to keep tickets reasonably cheap, improvements in the public transport system, including extension of the metro line to Vuosaari and the city rail track between Tikkurila Helsinki and a considerable rise in motoring costs. Also more dwellings have been built in the inner city in almost the same ratio as average in the metropolitan area.

Table 12.1 Mode of transport by journey type in the Helsinki Metropolitan Area in 2000.

	Means of transport				
	Total %	Cycle or on foot	Public transport	Car	Other
Trip to or from home	100	15	39	46	1
School trip to or from home	100	42	42	15	1
Other trip to or from home	100	34	19	46	1
Non-home-related trip	100	25	23	50	2

Source: Liikkumistottumukset ja niiden muutokset pääkaupunkiseudulla vuonna 2000. Publication series of the Helsinki Metropolitan Area Council YTV C 2002:11.

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13. Future outlook

13.1 Changes in transport habits

Passenger and goods traffic continue to increase in the wake of population and economic growth. As incomes rise, greater population dispersion, smaller households and upholding the idea of a house and garden further fragment the social structure, which in turn lengthens journeys and adds to the amount of private motoring.

The population is ageing and average life expectancy increasing. Future senior citizens will be more mobile than those of a similar age today. Unlike today's senior citizens who have learned to save, future senior citizens are used to consuming, travelling, and using services. Using a car is a natural part of life and in future also increasingly more female senior citizens will hold a driving licence.

Leisure time travel is likely to increase with people travelling much farther afield. As incomes rise, people become less worried about the cost of travel and their mobility increases. The daily amount of time used for getting around is likely to remain unchanged and people will switch to faster modes of transport.

Advances made in information technology may have a major impact on the forms of transport used. The number of jobs suitable for teleworking is constantly growing. Increasing contacts in both working and private life, coupled with the ease with which information is readily available, bring about a greater need for personal contacts. Whilst e-commerce reduces the number of visits to shops and similar places, it also gives rise to more delivery traffic. Although teleworking can help reduce commuting and congestion, there may well be a rise in other kinds of journeys.

People's values and attitudes change, although there are conflicting views on the impacts of these changes. Cycling and walking will increase if health and environmental attitudes strengthen. Journeys are poised to lengthen as the social fabric grows more fragmented, which in turn will reduce the share of light traffic. Some researchers see society undergoing major individualisation. This and an emphasis on independency add to private motoring.

Public transport in the Helsinki Metropolitan Area works best into and out of the centre of Helsinki. Nevertheless, land use and mobility are increasing on the outskirts of the area, where cars are used for most journeys. It is thought commuting within the area will continue increasing, as will commuting across the area's boundary.

13.2 Transport system development in Helsinki

Outlines for developing the transport system in Helsinki were given in the proposed 2002 master plan, which the City Planning Committee started to consider in December 2002.

The principal aim of transport system development continues to be to make public transport increasingly more competitive compared to private motoring. Since the rail network forms the backbone of the public transport system, work on improving and extending this network plays a key role in developing public transport.

13.2.1 Public transport

Rail transport network development projects

Extension of the metro from the Ruoholahti district of Helsinki to south Espoo via Lauttasaari and Koivusaari is the main project in plans to develop the transport system. If a decision is made during 2003 to continue work on planning the West Metro, a start can be made on construction work from Ruoholahti westwards during the current decade. This would mean the metro line to Espoo could be operative in around 2015.

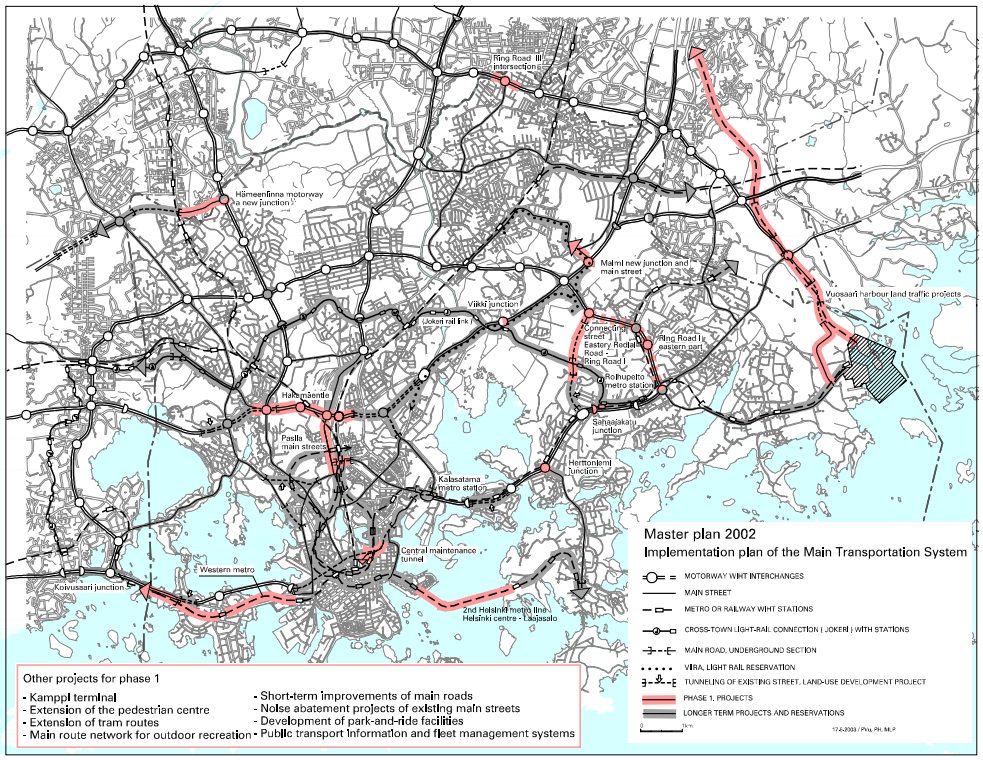
The proposed 2002 master plan also includes a second metro line, from Pasila to Kamppi via Meilahti and Töölö and further to Laajasalo via Erottaja, the Market Square and Katajanokka. The metro could also later be taken to Santahamina if it becomes a residential area. Meilahti would be home to a bus terminal for bus routes serving the northwest of Helsinki.

On the existing metro line, new stations will be built at Kalasatama and Roihupelto in connection with land use development. At Vuosaari, the metro will continue to the workplace zone at the new harbour. Development of the urban structure in these directions also includes extending the metro eastwards from Mellunmäki to Sipoo or Vantaa.

Another important development project in the area's rail transport system is the Pisara rail loop, which would start underground from the main railway line at Eläintarha and go under Etu-Töölö to the city centre and further on to Hakaniemi, from where the tunnel line would rejoin the main railway line at Alppipuisto. Stations on the loop would be Centre, Hakaniemi and possibly Etu-Töölö.

The loop would enable commuter trains currently terminating at the central railway station to be combined into shuttle lines between various track directions. Shuttle lines would considerably cut trafficking costs and platform needs at the central railway station and thus allow the station yard to be reduced in size. Shorter walking distances and easier changes to metro and tram routes in the city centre will improve the level of service, with improved connections outside the inner city. The Pisara loop would provide a sound platform on which to develop rail transport in the area in, for example, the Klaukkala direction.

Map 13.1 Main transport system implementation plan.



Source: Helsingin yleiskaava 2002, ehdotus, selostus, Helsinki City Planning Department's publication series 2002:17, 19.12.2002

The proposed 2002 master plan retains an option for a track eastwards from Tapanila to Porvoo via Jakomäki, although it currently seems unlikely that this would be built.

Trams will strengthen their role in the inner city transport system and tramlines will be extended to new residential areas in the inner city, Sompasaari, Kalasatama and Arabiaranta on the eastern waterfront of the city and Jätkäsaari. In future, tram services may be introduced to Viikki and the Malmi Airport area. The Jokeri system is first being implemented as a transverse bus route, but could be later changed to a tram route.

Bus traffic

As the rail network expands and direct suburban bus routes increasingly terminate at rail stations outside the city centre, the future will see a decline in bus traffic and the terminuses they use in the city centre.

Water traffic

The role of water traffic is poised to increase in future, at least in the Laajasalo direction, as a new residential district springs up on the waterfront at Kruunuvuorenranta. High costs, however, mean that water traffic will not constitute the principal form of transport between Kruunuvuorenranta and the city centre.

13.2.2 Main street system

Only a few new connections need to be built in the main Helsinki street system. In fact the only new main street connection needed is in the eastern district, the Kivikonlaita junction from Viikintie road to Ring I. However, there is a need to improve existing street system connections in transverse traffic. Major transverse street connections requiring improvement are Ring I, Hakamäentie-Pasilanväylä and the Central Tunnel.

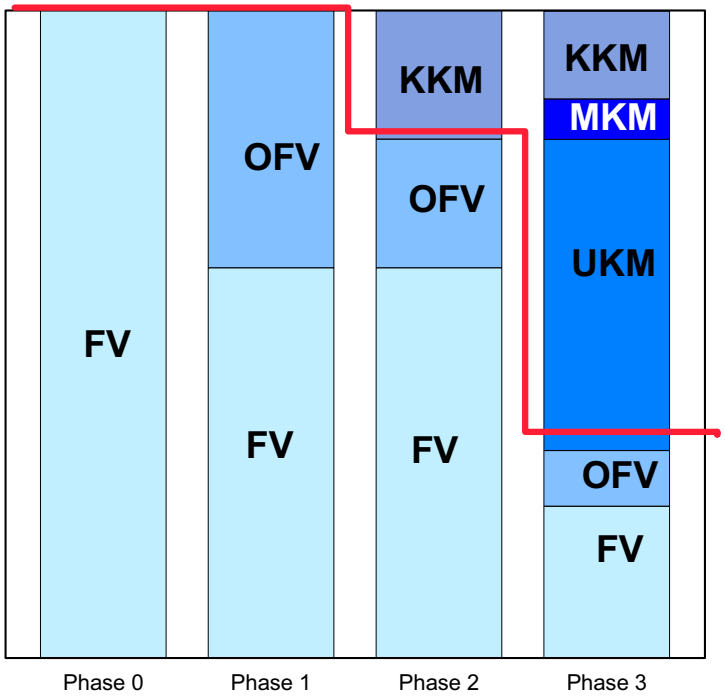
13.3 Future funding of transport investments

The cost of carrying out the improvement projects in the transport system, shown in the proposed 2002 master plan, in the Helsinki area are € 2.5 billion, of which the city of Helsinki's share is €1.5 billion. It is obvious that implementing these projects within a reasonable time calls for new financing initiatives.

A working group set up by the Ministry of Transport and Communications in late 2000 recently studied transport investment financing issues. Each of the phases for progression suggested by the working group creates a platform for the following stage. The proposal essentially applies to funding road and street traffic. Covering a period of around 15 years, progress with implementing the proposal will be made by switching from regulatory taxation and the development of basic route maintenance budgeting to tax-like user charges and ultimately to user pricing based on positioning.

However, the working group's development idea for transport pricing and distribution of accrued funds proposed is extremely justified both from the transport management and transport investment aspects. Fees collected from traffic could be used to considerably better manage and control the rate of traffic, its direction and the timing of journeys. The fees would be used much more than at present to pay for traffic facilities provided both on the state's public roads and on municipal streets. The final stage of the proposal requires a positioning system in all vehicles. Technically, this system could be implemented during the 2010s at the earliest.

Figure 13.1 Replacement of fiscal road taxes by other payments.



Abbreviations:

FV	Present fiscal taxes
OFV	Fiscal taxes that direct traffic and environmental policy
KKM	Fixed tax-nature fee and renewed street fee
MKM	Dynamic fee
UKM	Fee including external expenses

Source: Väyläpalvelujen rahoituksen uudet mallit, publication 6/2002 of the Ministry of Transport and Communications

As far as the motorist is concerned, the new traffic pricing would mean cheaper fuel and possibly cheaper vehicles through lower special taxes. Conversely, motorists would have to pay more for route charges depending on how much, when and where they drive. Although this means much higher motoring costs than at present, car ownership taxes and charges would be lower. Payments would depend more on car usage based on the charges incurred by using route services. Thus the "user pays" principle would be implemented much better than it is at present. From the city's perspective, the new model of funding route services would mean a fairer return to the city of payments collected from motorists for services. This means less money from municipal taxes would be spent on transport.

13.4 Transport telematics

Transport telematics means integrating information and communication technology into transport. Telematics would be used in a bid to improve transport throughput, safety, reliability and service and is currently the most significant individual factor changing and improving transport function.

Helsinki already currently has many transport telematics applications in use. These include a traffic signal system with related traffic cameras, the Helmi telematics system that improves public transport regularity and passenger information, real-time parking facility information, tunnel control on the Eliel Saarisen tien road and car parking charge schemes, where payment is made using electronic vehicle-specific Parcard hardware or mobile phone. Traffic information broadcast by radio stations is also a form of telematics as is the camera monitoring system used by Helsinki police in speed control. Increasingly more information is being delivered via the internet, television, mobile phones and vehicle computer systems and their monitors, real-time roadside information, radio stations and special traffic information points.

Distribution of information calls for an extremely comprehensive information and monitoring system and cooperation between different players in the transport system. Only reliable information is able to be used and in demand so that people could be prepared to pay for it.

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