Transport analysis

Commuting in Stockholm, Gothenburg and Malmö – a current state analysis

Summary
Report 2011:3

Commuting in Stockholm, Gothenburg and Malmö – a current state analysis

Summary
Report 2011:3

Transport Analysis
Address: Torsgatan 30
SE-113 21 Stockholm
Phone: 010 414 42 00
Fax: 010 414 42 10
E-mail: trafikanalys@trafa.se
Webaddress: www.trafa.se
Publisher: Brita Saxton
Publication date: 2011-05-31

Summary

Travel and shipping help form the economic foundation of society, the thread that weaves together its various parts through both physical and social networks. The *physical* infrastructure consists of links and nodes in a system of networks handling flows of people, goods, and information – what we refer to in everyday speech as roads, railroads, bus stations, terminals, etc. The *social infrastructure* consists, for example, of formal and informal regulations and laws, shared values, and a common knowledge base; this infrastructure also determines how society is tied together.

This report presents a current state analysis of how the various parts of the transportation system appear and are used by passengers within Sweden's three major metropolitan areas, and to and from their surrounding areas, with a particular emphasis on commuting to and from work. The report also includes an inventory of factors that households take into consideration in terms of mobility in the labour and housing markets. This current state analysis identifies several deficiencies and estimates some of their associated costs. Finally, some proposed measures for improving the commuting options in our metropolitan areas are discussed.

1.1 Offering, demand, and transportation

The transportation system and its configuration affect how we use the system, the modes of transport we use, and how often and how far we travel. A large share of the population in metropolitan areas commutes every day (see Figure 3.1). Local commuting accounts for most commuting in metropolitan areas. The situation in the Malmö region is somewhat different, with greater shares commuting both to and from the area and to and from Denmark.

The *average trip length* is naturally considerably longer for those who commute to/from metropolitan areas than within them. The average length per commuting trip within the defined metropolitan area is the same in the Gothenburg and Stockholm areas, while trips are shorter in the Malmö area.

Travel times for commuters from surrounding areas are considerably longer than for commuters *within* each metropolitan area (see Table 3.2). However, the average travel speed of these longer commutes is considerably higher, on the order of twice as high. Travel time per trip is roughly the same for men and women in all reported commutes, except for the commute to/from Malmö, where women have a considerably longer travel time (i.e., men = 45 minutes/trip and women = 60 minutes/trip, for an average of 52 minutes/trip). Only approximately 15% of the labour force in Sweden commutes for over one hour per day, round trip, while the average travel time for work commutes is 39 minutes per day, round trip.[1] Commuting times are longer in metropolitan regions than in the rest of the country, as is evident in the average travel time per trip (see Table 3.2).

Most commuting trips are made by passenger car (see

1 Swedish Institute for Transport and Communications Analysis [SIKA] (2007a).

Figure 0.1). This applies to trips *within* metropolitan areas as well, although some 20–30% of such trips are made on foot or by bicycle. If we look instead at the breakdown by transport mode based on the person/kilometres attributable to commuting, the shares of both passenger cars and trains increase while the shares of walking and bicycling naturally decline (see Figure 0.2).

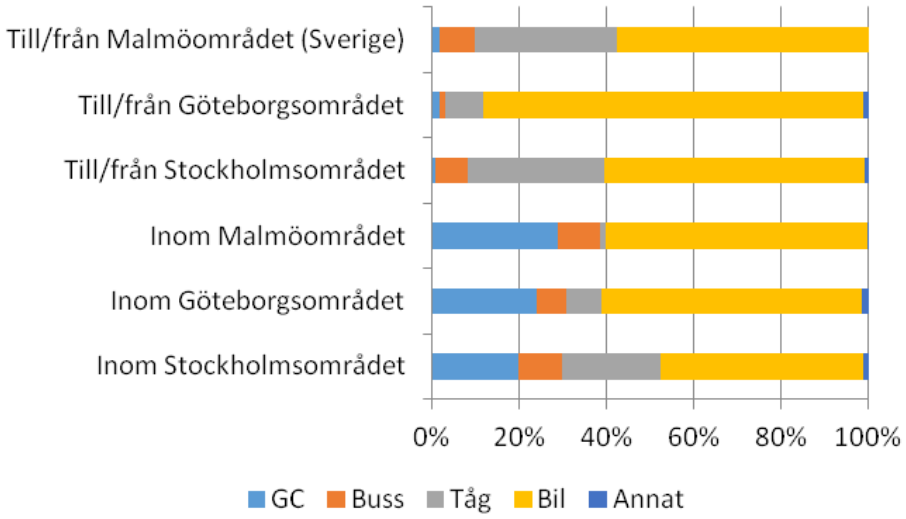

Figure 0.1. The number of work commutes in the studied commuting areas, by transport mode. Sources: SIKA (2007a) and Statistics Sweden.

Key:
Till/from = To/from

Göteborgsområdet = Gothenburg area

Malmöområdet = Malmö area

Sverige = Sweden

Stockholmsområdet = Stockholm area

Inom = Within

GC = Pedestrian/cycling path

Buss = Bus

Tåg = Train

Bil = Passenger car

Annat = Other

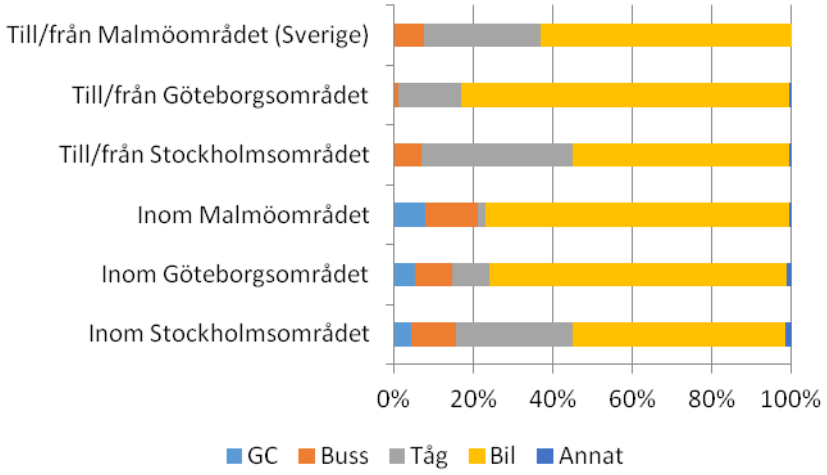

Figure 0.2. Length in person/kilometres of work commutes in the studied commuting areas, by transport mode. Sources: SIKA (2007a) and Statistics Sweden.

Key:

Till/from = To/from

Göteborgsområdet = Gothenburg area

Malmöområdet = Malmö area

Sverige = Sweden

Stockholmsområdet = Stockholm area

Inom = Within

GC = Pedestrian/cycling path

Buss = Bus

Tåg = Train

Bil = Passenger car

Annat = Other

Men account for more commuting in terms of both number of trips and total travel distance than do women, the difference being even greater in terms of person kilometres than in number of trips (see Table 3.3, Figure 3.4, and Figure 3.5). This difference is attributable to the longer trips made by men, as manifested in the larger share of kilometres men travel by train and the smaller share by walking/bicycling compared with women. Men account for 55% of work commutes, business trips, and trips for education/training, while women account for 55% of trips for services and shopping.

Stockholm

The major commuter flows in the Stockholm region occur on the following routes: Gävle–Uppsala–Stockholm, Nyköping–Stockholm, Hallsberg–Vingåker–Katrineholm–Flen–Stockholm, Örebro–Västerås–Enköping–Stockholm, and Arboga–Eskilstuna–Strängnäs–Stockholm. Although the distance is great, a great deal of commuting also occurs on the Linköping–Norrköping–Stockholm stretch.

The major commuter flows converge on Stockholm, although there is also a great deal of commuting to places such as Västerås, Örebro, and Uppsala from surrounding locations and, in the case of Uppsala, from Stockholm. The major commuter routes generally follow the major roads and motorways (i.e., E18 and E20) and the railroads.

Commuting within Stockholm County is primarily radial from all directions, with the major flows travelling on railroads, metro lines, and major roads (i.e., E4, E18, E20, and Highways 73 and 222) toward the core, which comprises central Stockholm plus Solna and Sundbyberg. Other locations that account for relatively high levels of commuting into the city include Kista, Södertälje, Arlanda, and Flemingsberg/Huddinge. These are common destinations for commuters from Mälardalen as well.

Most commutes into the regional centre occur via public transport, while most trips to the outlying areas are by passenger car. In a one-hour car trip, it is possible to reach Stockholm from Gnesta and Tystberga to the south, from Strängnäs and, slightly farther out, Enköping to the west, from Old Uppsala to the north, and from Kapellskär to the northeast. However, commutes in Stockholm and Mälardalen are longer on average than in other parts of the country, meaning that the limit of roughly one hour of travel, which is often considered acceptable, is not always applicable.

Gothenburg

Gothenburg's labour market region is characterised by monocentricity, i.e., Gothenburg is strongly dominant as the work commuting destination. Of the total morning work commutes in the region, approximately 85% are to Gothenburg whereas only 15% are from Gothenburg. This unequal directional breakdown places heavy demands on the capacity of both the public transport system and the transportation infrastructure.[2] This is obvious to both public transport passengers and those who drive their own cars, as both these categories are prone to delays, poor on-time performance, and rush-hour disruptions.

Commuting in the region occurs mainly along the roads and railways approaching Gothenburg, i.e., along the E6 and the Bohusbanan from Uddevalla, Highway 45 and the Norge-Vänerbanan from Trollhättan/Vänersborg, the E20 and the Västra Stambanan from Skövde, Highway 40 and the Kust-till-kustbanan from Borås, and the E6 and the Västkustbanan from Varberg. Two secondary stretches also worth mentioning are Route 158 from Särö and Route 155 from Öckerö. In addition to these, the E6 – Söderleden/Västerleden/Hisingsleden/ Norrleden and the E6 – Lundbyleden are important routes for passenger cars.

The primary routes into Gothenburg consist of motorways, with the exception of Highway 45, which is being expanded into a four-lane highway by December 2012. The Västkustbanan and

2 By way of comparison, the Malmö region is characterised by polycentricity, i.e., commuting to work and school exhibits a more balanced directional breakdown, often roughly 50/50 (Trivector Traffic AB, 2008).

the Västra Stambanan are double tracked, and the Norge–Vänerbanan will be double tracked by December 2012. The Bohusbanan and the Kust-till-kustbanan are single tracked.

Malmö

Skåne is a multicore region, and work commutes there are mainly to Malmö, but also to Helsingborg, Lund, and Kristianstad. The commute across the Öresund to and from the Copenhagen area is very important to the region.

Despite a great increase in train traffic in the region (by roughly 45% from 2006 to 2010), rail travel accounts for a relatively small share of the commuter trips *within* what is classed here as the Malmö area (see Figure 3.2 and Figure 3.3). On the other hand, rail travel does account for a large share of the commuter trips *to/from* the Malmö area.

The biggest commuter routes, which link Malmö, Helsingborg, and Lund and also include the Öresund Bridge, each see more than 10,000 commuters daily in each direction. In addition to those routes, over 3000 commuters travel in each direction on the major commuting routes around Malmö, Lund, Helsingborg, and Kristianstad. Stretches carrying over 2000 commuters each form a network that ties together the various communities and major urban areas of Skåne; such stretches include those from Kristianstad, Hässleholm, and Ystad to Malmö/Lund.[3] The routes that see more than 1000 work commuters each form a finer-meshed network of commuting routes around the urban areas of Hässleholm, Ängelholm, Ystad, and Trelleborg. These routes now also tie together Skåne between Kristianstad and Helsingborg, while other key two-way connections also stand out, such as Trelleborg–Lund and Eslöv–Landskrona. The most important commuter stretches run toward Malmö along the E6 from Trelleborg and Helsingborg, Route 100 from Falsterbo, , the E65 from Ystad, E22 and Route 11, and along the railroads, i.e. the Ystadbanan, the Västkustbanan och the Södra Stambanan (see Figure 3.32).

Like Malmö, Lund also has a strong regional function – even stronger relative to the size of its urban area. Half of all those who work in Lund live more than 10 km from their workplace. One difference from Malmö is that commuting *from* Lund is not as dispersed, but rather occurs to a greater extent to a limited number of major urban areas. As a result, the accessibility is better as are the conditions favouring travel by public transport. In addition to occurring along the stretches that lead to Malmö, commutes to Lund also occur along Routes 23 and 108 from Kävlinge and Route 113 from Eslöv (see Figure 3.33).

Its proximity to Denmark is also a special feature of the Malmö region. Commuting across the national border has increased steadily because of the Öresund Bridge. The circumstances surrounding and evolution of this commute depend on conditions not only in Sweden but also in Denmark, and on both in relation to one another.

Since the opening of the Öresund Bridge in 2000, commuting across the Öresund has increased dramatically, from approximately 3000 commuters a day between Sweden and Denmark in 1995 to 19,100 in 2008. Of these, 15,400 commuted between the Malmö region and Denmark.

3 Region Skåne (2008).

1.2 Passenger considerations

Factors that determine travel patterns

Within the transport sector, the results of decisions about how to travel to work are commonly referred to in terms of trip length, travel time, transport mode, travel cost, etc. However, such factors are also related to broader considerations with respect to job choice, place of residence, and the options available for travel between home and workplace. Individual decisions about commuting to work are therefore the result of trade-offs between the residential environment, living space, job satisfaction, the comfort level of the transport mode used, etc., and various restrictions. Such restrictions may pertain, for example, to housing market prices, employment opportunities and compensation levels in the labour market, financial and time expenditures associated with various alternative transport modes, and time restrictions relevant to the commuting individual and other household members. Individual considerations in terms of commuting to work are thus affected by a host of factors, although transport system configuration does play a key role. As a result, individual considerations with regard to commuting to work affect the results and effects of investments and other initiatives in the transport system.

Travel habits depend on many factors, such as geographical distance, income, social roles, cultural differences, habits, values, and attitudes. Some examples of how differences in conditions and assumptions affect travel habits are provided below. In the following sections, we will focus on values (in general, but to some extent in terms of differences between men and women) and attitudes.

Figure 5.1 and Figure 5.2 show that differences exist between men and women within the same life-cycle group with respect to the number of trips per day and the number of work- and school-related trips per day. At the same time, men make more work- and school-related trips on average than do women within the various life-cycle groups, with the exception of the "young singles" life-cycle group. There are relatively large differences between the "young cohabitants" and "cohabitants with small children" life-cycle groups.

However, there are differences between men and women with respect to the proportions of those who work full-time and part-time.[4] Because the study is limited to men and women *who are working full-time*, the differences in the number of work- and school-related trips per day for men and women are diminished (Figure 5.2 compared with Figure 5.3). This applies in particular to the "cohabitants with small children" group. Women who are working full-time also make more work- and school-related trips than do men in the "single with small children" group. In the "young singles" group, the differences in the number of work- and school-related trips per day are very small between men and women who are working full-time, while such differences are greatest within the "young cohabitants" group.

4 According to the 2005 Labour Force Survey (LFS), 72% of men aged 20–64 were working full-time, i.e., 35 hours or more per week. The corresponding figure for women was only 49%. The share of men working part-time for 20–34 hours per week was 6%, while the share for women was 23%. Somewhat more women (4%) worked part-time for 1–19 hours per week than was the case for men (2%). Those who were unemployed were either jobless or not in the labour force, and their primary activities consisted of, for example, keeping house, studies, retirement, long-term sick-leave, and admission for care (Statistics Sweden [SCB], 2006). Women were thus employed part-time to a greater extent than were men, and a somewhat higher proportion of women was not in the labour force (i.e., 20% of women vs. 14% of men) and could be expected to make fewer work- and school-related trips. The question remains as to whether these differences persist when women employed part-time begin working full-time.

Generally speaking, different conditions and assumptions cannot fully account for the travel differences between men and women, i.e., behavioural differences also exist in the form of different values, i.e., “subjective factors”. In combination with differences in conditions and assumptions, these values account for the relatively large variations in travel patterns between men and women that travel habit surveys have identified.

Travel times and travel costs are important in determining the choice of transport mode, but attitudes and behaviour are significant as well. A preference for comfort increases the likelihood that an individual will choose to take the bus rather than drive the car to work, or to take the train rather than the bus. If an individual prefers flexibility, the likelihood increases that he/she will drive the car rather than take the bus. Concern for the environment increases the likelihood of choosing the train rather than the bus, but has no impact on the choice between car and bus. Women exhibit stronger environmental concerns than do men.

It is also possible, based on in-depth interviews, to discern a number of themes pertaining to the conditions and assumptions surrounding commuting, and to perceptions of travel to and from work.[5]

Finally, the choice of transport mode is determined by financial incentives, such as tax-deductible travel expenses, benefit taxation, subsidised workplace parking, and congestion taxes.

The housing and labour markets

In general, the results indicate that the more a job pays, the lower the likelihood that an individual will leave it.[6] Moreover, the likelihood of changing jobs is higher for individuals with long travel times (trip lengths) than for those with short travel times (trip lengths). This indicates that individuals make a trade-off between pay and travel time when making decisions about whether they should look for a new job. A model can consequently be used to calculate the marginal willingness to pay in order to reduce an individual’s travel time (i.e., the time value of trips to and from work).

The literature concerning movements in the labour and housing markets has focussed mainly on single-income households;[7] how commuting-related factors affect where people live differs in two-income households. In such cases, there are usually two workplaces and thus two commuting distances that the household must take into account when choosing where to live. Models consequently study *both* job mobility and housing mobility.[8]

Three conclusions may be derived from these analyses with respect to *housing mobility*. First, the likelihood that an individual’s household will change residences increases the farther he or she has to travel to work. Correspondingly, the likelihood that an individual’s household will move increases if the individual’s partner has a long commute to work. Third, the greater the distance between the workplaces of two domestic partners, the lower the likelihood that the household will relocate. This is because the gains that one person may make in terms of reduced travel time by moving closer to their job are offset by longer travel time for their partner.

Three conclusions also emerge with respect to *job mobility*. First, the likelihood that an individual will change jobs increases the farther he or she has to travel to get to work. This

5 Friberg, Brusman, and Nilsson (2004).
6 van Ommeren, van den Berg, and Gorter (2000) and van Ommeren and Forgerau (2009).
7 van Ommeren, Deding, and Filges (2009).
8 van Ommeren, Rietveld, and Nijkamp (1998) and the empirical analysis presented by van Ommeren, Deding, and Filges (2009).

echoes the conclusions derived from the models mentioned earlier in this section. Second, the likelihood that an individual will change jobs decreases with their partner's travel time, i.e., the farther their partner must travel to get to work, the less likely an individual is to change jobs. The latter is because, if the partner must travel a long time to get to work, it increases the likelihood of future housing mobility, reducing the advantages associated with changing to a job closer to the current residence. Third, a greater distance between the two partners' workplaces increases the likelihood that both individuals in the household will change jobs. This is because the shorter the distance between the workplaces, the greater the opportunities in terms of reducing the travel times for both individuals by moving. As a result, it may be advantageous to first change jobs and thus decrease the distance between the workplaces, thereby increasing the future options in terms of making a move that improves matters for both individuals in the household.

Empirical analyses[9] indicate that the effects of the three distance variables on job and housing mobility are relatively major. Housing mobility is lower among households with children than among those without children. The partner's distance to his or her job appears to have a lesser effect on personal job mobility among households with children. In addition, job mobility tends to be higher for women in households with children, possibly because they must take greater responsibility for the children. Other results in this study indicate that the likelihood of moving or changing jobs decreases with the age of the man and woman in the household, and that the larger the living space, the lower the likelihood that the household will relocate. The likelihood that households that are renting will move is greater than the likelihood that households that own their own homes will move.

Movements in either the housing or labour market from 1986 to 1998 led to an average increase in commuting times.[10] The greatest increase in commuting times occurred after movements in *both* the housing and labour markets, while the smallest increase occurred after movement in the labour market only. The results of analyses of different counties indicate a significant increase in commuting times following movements in the housing market in most counties, including in Stockholm, Västra Götaland, and Skåne counties. The counties that exhibited a decrease in commuting times after a change of residence were Uppsala and Södermanland. No significant decrease in commuting times occurred in any of the counties following movements in the labour market only.

The average commuting distance (as the crow flies) (Tables 5.7–5.10) for individuals employed in the Greater Stockholm, Greater Gothenburg, and Greater Malmö areas,[11] both collectively and for each city, has been studied for 2003 and 2008 based on register data material. The results indicate that the average commuting distance for individuals who choose to change jobs, move, or both move and change jobs is greater than that of those who neither move nor change jobs. This applies both before 2003 and after moving and changing jobs in 2008.

9 van Ommeren, Deding, and Filges (2009).
10 Swärdh (2009).
11 Major metropolitan areas as defined by Statistics Sweden.

1.3 Deficiencies and costs

Table 0**.**1 summarises the identified transport system deficiencies and their impacts on work commuting. It should be noted that all rated items reduce the feasibility of commuting to work. Some of these deficiencies could represent major problems for certain commuters, but here we indicate only their impact on work commuting as a whole in the region. The impact assessment is qualitative, based on interviews and on knowledge retrieved from earlier studies and analyses. The assessment pertains to current deficiencies, and does not take into account planned initiatives or the anticipated potential needs arising from future growth and development.

The Stockholm region is affected the most and will, despite major investments, probably be encumbered by more bottlenecks by 2030 than at present on both its roads and railroads. Road system congestion is expected to be five times greater in terms of traffic jam lengths, as road traffic is growing significantly more rapidly (80%) than the population (25%).[12] Because congestion cannot be "built away" through investments in roads,[13] significant initiatives in terms of expanded public transport will be necessary. An efficient public transport alternative creates greater freedom of choice for commuters and more favourable conditions for a long-term sustainable supply of transport consistent with our overarching transport policy objective.

The Gothenburg region is faced with the imposition of congestion fees, which will reduce congestion for car drivers, trams, and buses, which are hard hit in the region. The region is characterised by a high proportion of passenger cars relative to its size and situation, and is working to expand its public transport system through the K2020 cooperative project.

12 Office of Regional Planning [Regionplanenämnden] (2009). The population growth is predicted to be approximately 20,000 people per year, i.e., by 535,000 for a total of 2.4 million inhabitants by 2030. In a more conservative scenario, the increase is expected to total 315,000 inhabitants. Per capita incomes are expected to rise by just over 2% to nearly 3% per year from 2005 to 2030.
13 Smidfelt Rosqvist and Hagson (2009).

Table 0.1. Identified deficiencies affecting work commuting in the three major metropolitan areas, with assessments of their impact on work commuting. Deficiencies in some regions could not be considered problematic from the standpoint of work commuting, so the corresponding boxes are empty.

Identified deficiencies	Affected transport mode	Stockholm	Gothenburg	Malmö
Deficient road system capacity toward the city centre	Passenger cars and buses	HIGH	HIGH	AVERAGE
Deficient railroad system capacity	Trains	HIGH	HIGH	HIGH
Deficient regional train service	Trains	AVERAGE	HIGH	AVERAGE
Poor replacement services in connection with planned railroad closures	Trains	LOW	LOW	LOW
Lack of park-and-ride parking spaces	Passenger cars, trains, and buses	LOW	LOW	AVERAGE
Lack of dedicated lanes for public transport	Buses	AVERAGE	HIGH	HIGH
Deficient winter preparedness	Trains, passenger cars, and buses	AVERAGE	AVERAGE	AVERAGE
Deficient traffic information systems	Trains, buses, and metro	AVERAGE	AVERAGE	AVERAGE
Long closures in connection with major road accidents	Passenger cars and buses	LOW		
Lack of maritime traffic	Maritime traffic	LOW		
Poorly designed transfer points	Trains, buses, metro, and trams	AVERAGE	HIGH	LOW
Bus and train on board congestion	Trains and buses	AVERAGE	LOW	AVERAGE
Deficient bicycle path system capacity	Bicycles	LOW	LOW	LOW
Disruptions in road system due to construction work	Passenger cars and buses	LOW		
Lack of access to open waiting areas	Trains and buses	LOW	LOW	LOW
Lack of safe pedestrian paths	Pedestrians	LOW	LOW	LOW

The Malmö region has doubled its use of public transport in recent years, and the opening of the City Tunnel has dramatically changed the conditions and assumptions concerning rail traffic there. Three of the cities in the region (i.e., Malmö, Lund, and Helsingborg) are working together intensively to introduce trams. With regard to commuting delays, the region is characterised by major rail capacity problems, as a result of which the region faces delay-related costs on a par with Gothenburg, which has both more inhabitants and a higher proportion of rail service does than the Malmö region.

Obvious deficiencies in the current infrastructure and public transport offering will affect work commuting in all three regions. In the long term, the effects of these deficiencies may include suppressed demand for work commuting, which could lead to tighter housing and labour markets, a halt to regional integration, and poorer opportunities for regional and national growth.

The future prognosis for the traffic situation and thus the opportunities for efficient commuting to and from jobs in the three major metropolitan regions looks bleak at present. Deficiencies in terms of rail service capacity mainly account for the major costs.

It is worth reflecting on the fact that when people talk about capacity deficiencies in the road system, they are almost exclusively referring to the traffic capacity, i.e., the number of vehicles that the roads can accommodate. However, traffic capacity is a blunt metric for transport capacity, i.e., how many people or what volume of goods can be transported via a road or road system.

The magnitude of the combined costs of the deficiencies in terms of work commuting has been roughly estimated at SEK 11.5 billion per year. Rail traffic and buses account for the highest costs stemming from delays and congestion, while the costs of atmospheric emissions are attributable mainly to commuting to work by car. The lack of capacity in the rail system, primarily in those regions where different types of traffic compete, often entails heavy societal costs in terms of commuting to work in the major metropolitan regions (see Table 7.9). At the same time, rail traffic accounts for a very small share of the emission-related costs (Table 7.10). Women are currently affected more by delay-related costs than are men; at the same time, women cause far lower emission-related costs than do men (Figure 7.1).

Finally, it is clear that gaps still remain in our basic understanding of how congestion in the transport system affects work commuters in the form of delays, and how this in turn affects society in the form of socio-economic costs. In the case of passenger car traffic, relevant measurements are available only for certain stretches of road in the major cities and do not provide a comprehensive picture. The public transport industry has a significant volume of measurements and statistics, but they are collected in different ways by different actors, and are often difficult to compare.

In summary, most of the evidence indicates that unless appropriate actions are taken, the deficiencies observed today will worsen dramatically in coming decades. This would have considerable impact on passengers' opportunities in terms of commuting to work, and runs counter to the direction of our transport policy goals and principles. In the long run, this would threaten opportunities for regional and national growth.

Transport analysis

Transport Analysis is a Swedish agency for transport policy analysis. We analyse and evaluate proposed and implemented measures within the sphere of transport policy. We are also responsible for official statistics in the transport and communication sectors. Transport Analysis was established in April 2010 with its head office in Stockholm and a branch office in Östersund.

Transport Analysis
Torsgatan 30
SE-113 21 Stockholm

Phone +4610 414 42 00
Fax +4610 414 42 10
trafikanalys@trafa.se
www.trafa.se