



Congestion Charging Secretariat

EXECUTIVE OFFICE
CITY OF STOCKHOLM

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Reference Group

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REFERENCE GROUP'S SUMMARY

The Stockholm Trial: March

During the Stockholm Trial, so-called "monthly indicators" are presented each month. These indicators are measurements of, for example, car-traffic volumes, car-travel times, public-transport travel, the retail market and pedestrian and bicycle flows. The undersigned have been requested by the City of Stockholm to conduct ongoing analyses and summaries of these measurements. The goal is to provide an overview of the effects of the Stockholm Trial on car traffic, accessibility, public-transport travel and so on. Of necessity, this picture will be preliminary because there is no time for a more wide-ranging analysis of data. The aim, rather, is to provide a preliminary survey of effects while awaiting completion of the much deeper and more comprehensive assessment being conducted throughout the spring.

Summary of March observations

Traffic volumes continued to be much lower than normal but the decline slowed down somewhat. In March, traffic passing over the congestion-charging cordon during the charging period was about 23% less than in March 2005. Comparable figures for January/February were 28% and 24%, respectively.

Thus, the large congestion reductions seen in January/February also slowed down slightly, varying at different times and places. In particular, inner-city streets during the morning peak period once more had relatively high congestion, even if, in spite of winter road conditions, accessibility continued to be clearly better than during autumn 2005. Accessibility on radials, both in and out, and in the inner city during the afternoon/evening peak period, continued to be much better than normal.

Traffic on Essingeleden bypass increased slightly compared to March 2005 but the increase was small and essentially within normal variations (1-4% depending on the Essingeleden site where monitoring took place).

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Minor changes in comparative values

Earlier analyses of monthly indicators compared traffic during the month in question with traffic on an “average autumn weekday in 2005”. There have been a number of queries as to why the comparison has not instead been made with the comparable month in 2005 - meaning that it would be more logical to compare January 2006 with January 2005, February 2006 with February 2005, and so on. The reason why our comparisons were made with an “autumn weekday” is that traffic measurements for all monitoring sites for the entire spring period in 2005 do not exist - only a selection.¹ In our opinion, comparison with an “autumn weekday” provides a good picture of traffic changes since there are only small variations in traffic volumes in the period September-April.

Despite this, the Reference Group has decided to compare month-against-month from now on - as far as is possible - since the earlier approach led to a number of questions and sometimes caused confusion. In practice, this does not affect the conclusions hitherto presented since, as stated above, traffic volumes over the charging cordon vary by only a couple of percent, up or down, during the entire September-April period. The sole purpose is to dispel any potential confusion as to whether an “autumn weekday” is really a relevant comparison. A relatively detailed description of seasonal variations, variations between different years and how we have compensated for them can be found in an appendix. For the non-specialist it is enough to know that, in the congestion-charging zone, we will compare traffic for each month of 2006 with “estimated traffic” for the comparable month of 2005² (“estimated” since measurements were not conducted at all charging-zone monitoring sites for every month of 2005), while the E4 motorway/Essingeleden/Södra Länken bypass tunnel will be compared to actual measured traffic in the comparable 2005 month.

Finally, a legitimate question is: Can different years really be compared since traffic is affected by changes in, for example, petrol prices, economic developments and population figures? The answer is that these factors play a role but that traffic over the charging cordon varies very little from year to year. During the past 15 years, the average variation has been less than 1% - the biggest variation between two different years being 2.6% (1997/1998).³ (In Stockholm County as a whole, traffic is affected to a greater degree by factors such as economic developments and population figures.)

¹ Decisions regarding the location of monitoring sites where measurements were conducted were not the result of a conscious selection but depended on which sites were equipped with automatic meters as early as spring 2005 and therewith in operation continuously during the whole of the spring period. However, measurements were conducted at all monitoring sites in April 2005, among other months. A more detailed description of which monitoring data is available and how it is used can be found in an appendix.

² A further (insignificant) complication is that a “month” is not exactly equivalent to an actual month. Christmas holidays and winter-vacation weeks are not included and the “month” starts on the 26th day of the previous month and ends on the 25th. The “months” of 2005 are split up in a similar manner, but not with exactly the same dates since the distribution of weekdays was not the same (the difference between various weekdays is significantly greater than that between different months during the period October-April). Details can be found in an appendix.

³ More details on yearly variations can be found in an appendix.

Car traffic and car-travel times - inner city and charging zone

Traffic effects described below relate to the period 6-24 March 2006.

Thus, neither the February nor March periods include the winter-vacation week.

- **Car traffic still much lower than normal.**

- The number of vehicles passing over the charging cordon during the congestion-charging period (6.30 a.m.-6.30 p.m.) during March 2006 (6-24 March) was about 23% lower than the number of (estimated)¹ passages in the same month in 2005.²

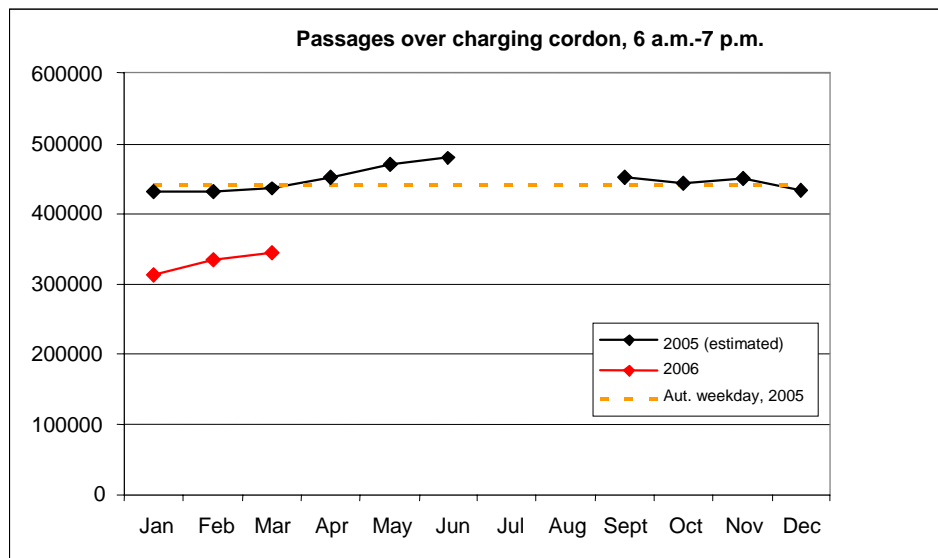


Figure 1. Number of vehicle passages over charging cordon during weekdays, 6 a.m.-7 p.m. (data from the monitoring systems of the Swedish National Road Administration and the City of Stockholm Traffic Office).

- The number of vehicle passages over the charging cordon in February 2006 (26 January-24 February) during the charging period was about 24% lower than in February 2005. In January 2006 (9-25 January), the decline - compared to January 2005 - was about 28%.
- Compared to the same period in 2005, the decline is equivalent to about 100,000 fewer car passages. It is still not possible to confidently translate this reduction to outward/return journeys.

¹ All traffic figures for spring 2005 (except April) are estimated by correcting autumn and April measurements with the yearly variation (measured via selected monitoring sites) - further details can be found in an appendix.

² For those who wish to make comparisons with the "old" reference value, "autuman weekday 2005", the change is 23.6%; if comparison is made with "estimated passages, March 2005", the change is, strictly calculated, 22.8%. The difference is thus insignificant (the margin of error for monitoring equipment is actually bigger than this difference); the transition to a comparative value of the type "month X, 2005" is motivated solely on pedagogical grounds.

The decline has decreased over time, but slowly.

- The number of passages over the charging cordon is increasing slowly week by week. The increase is small (about 1% per week) but the trend is clear.

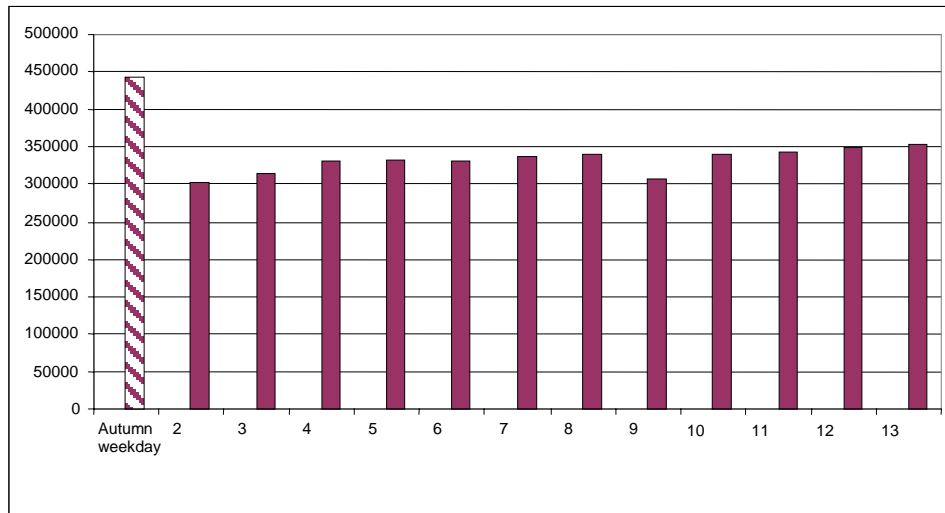


Figure 2. Average number of vehicle passages per day over charging cordon, weekdays, 6 a.m.-7 p.m., during the period 9 January-31 March, 2006 (data from control points).

- Figure 1 shows that traffic usually increases somewhat during the spring but this does not explain the entire traffic increase. During the period 23 January-31 March 2006, traffic passing over the charging cordon increased by a total of 7% while the increase in the comparable period in 2005 was only a couple of percent.

Lidingö traffic shows smallest decline - biggest traffic decline on radials with large share of through traffic.

	Charging period (6.30 a.m.- 6.30 p.m.)	Morning peak period (7-9 a.m.)	Afternoon/evening peak period (3.30-6 p.m.)
Entire charging zone	-23%	-17%	-25%
Charging zone – south-east	-27%	-21%	-28%
Charging zone – north	-24%	-18%	-29%
Charging zone – west	-21%	-19%	-23%
Charging zone – south	-25%	-20%	-25%
Charging zone – Lidingö ¹	-14%	-7%	-13%

Table 1. Percentage reduction of vehicle passages, March 2006 compared to March 2005.

- The decline was biggest from the south-east (Danvikstull), followed by the southern, northern and western radials. The most likely explanation for the differences between south-east, north/south and west is that they reflect the proportion of through-traffic: traffic from the west moves to a lesser degree *through* the inner city than traffic from the south, north and, in particular, south-east. From the south-east, Södra Länken makes it relatively easy to avoid the inner city.
- Traffic to/from Lidingö declined much less than on other radials. The reason is probably that a large part of traffic to/from Lidingö is not subject to the congestion tax.
- The table below shows comparable figures for January-March 2006. As can be seen, the trend is stable even if the decline has decreased somewhat over time. Changes between February and March are, however, relatively small.

¹ In the Reference Group's February report, the recorded decline from Lidingö was incorrect due to a faulty reference value for traffic in the morning peak period moving in towards the city.

	Charging period (6.30 a.m.-6.30 p.m.)			Morning peak period (7-9 a.m.)			Afternoon/evening peak period (3.30-6 p.m.)		
	Jan	Feb	Mar	Jan	Feb	Mar	Jan	Feb	Mar
Charging zone: Entire zone	-28%	-24%	-23%	-22%	-18%	-17%	-34%	-28%	-25%
South-east	-30%	-29%	-27%	-24%	-22%	-21%	-34%	-32%	-28%
North	-31%	-27%	-24%	-25%	-21%	-18%	-38%	-33%	-29%
West	-26%	-22%	-21%	-24%	-21%	-19%	-29%	-24%	-23%
South	-31%	-28%	-25%	-25%	-21%	-20%	-38%	-33%	-25%
Lidingö	-18%	-14%	-14%	-10%	-7%	-7%	-18%	-14%	-13%

Table 2. Percentage decline in vehicle passages in January-March 2006 compared to January-March 2005.

- **Traffic decline largest in afternoon/evening peak period. Traffic also declined in evening after charging period.**
 - In percentage terms, the decline is somewhat smaller during the morning peak period and somewhat larger during the afternoon/evening peak period. One possible partial explanation is that during the afternoon/evening there is more leisure travel (visits, entertainment, shopping), for which it is easier to change the destination. Another partial explanation is that during the morning a larger number of travellers are bound by time limitations than during the afternoon/evening.
 - Traffic also significantly declined in the evening after the charging period. The reason may be fewer outward/return journeys by car during the charging period, resulting in fewer return journeys during evenings after the charging period.

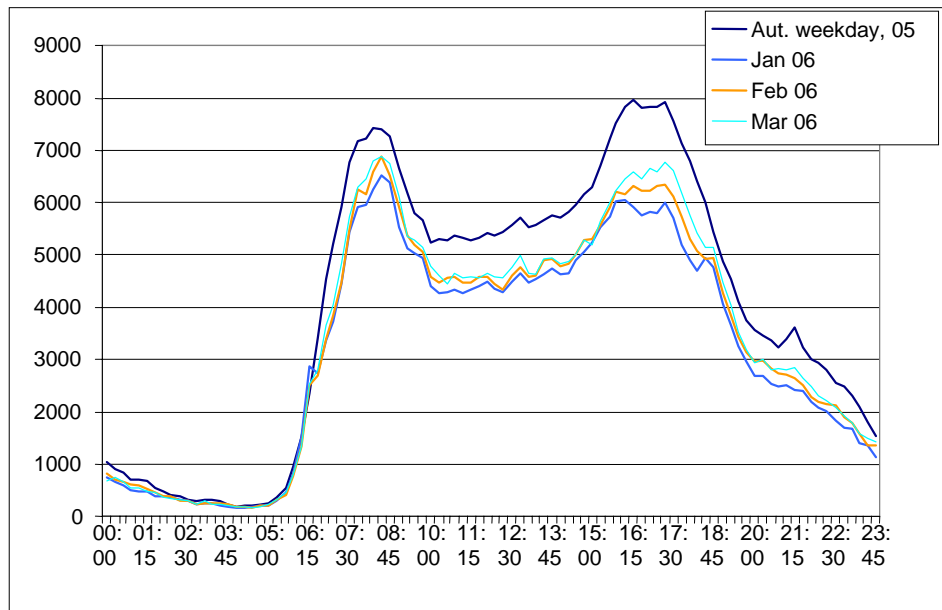


Figure 3. Number of vehicle passages (vehicles per hour) over the charging cordon during a 24-hour period (both directions). (Data from the monitoring systems of the Swedish National Road Administration and the City of Stockholm Traffic Office.)

- **Congestion during the morning peak period increased somewhat in March 2006 compared to January/February 2006, while congestion during the afternoon/evening peak period was generally unchanged from January/February.**
 - Access improvements on radials for traffic moving in towards the city during the morning peak period were still large but declined somewhat as traffic increased. During the afternoon/evening peak period, access improvements were generally unchanged from January/February 2006.
 - Access in the inner city worsened in March 2006 compared to January/February 2006. During the morning peak period, congestion in the inner city approached autumn 2005 levels, while access improvements continued to be large during the afternoon/evening peak period.

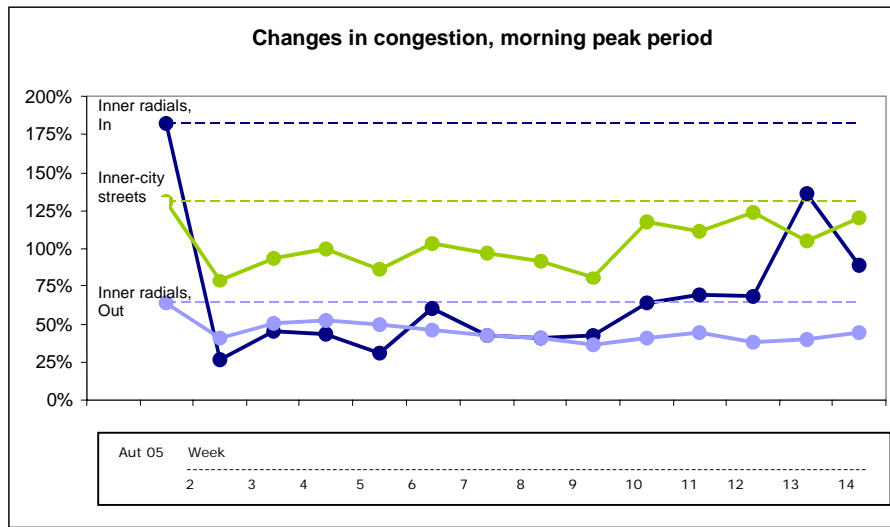
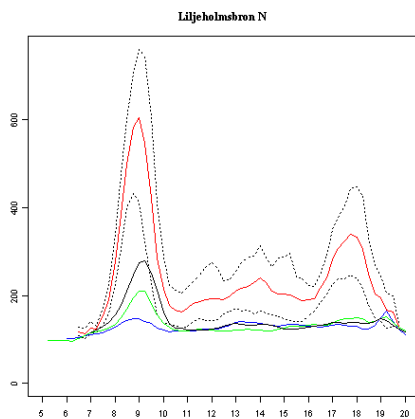
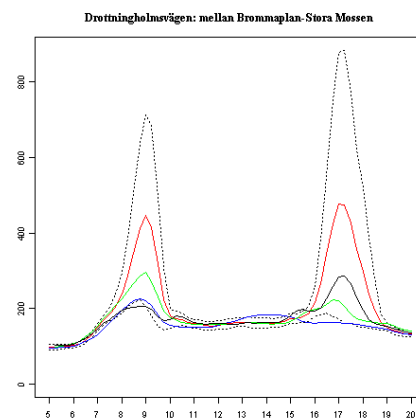


Figure 4. "Congestion" (average travel-time prolongation in percent compared to congestion-free travel time) for different types of road (7.30-9 a.m.).

- Congestion on orbitals outside the inner city continued unchanged compared to autumn 2005 - fears that congestion would increase on these roads have not been realized.
- Access improvements on outer radials were unchanged during both morning and afternoon/evening peak periods.
- A more detailed account of travel times can be found in an appendix.
- Below are four examples of travel times on various routes. They show how travel times during the morning peak period have increased compared to earlier weeks on Liljeholmsbron (bridge) and Valhallavägen (Roslagstull-Odensgatan) but that travel times are still clearly shorter than during autumn 2005.



Liljeholmsbron N



Drottningholmsvägen: between Brommaplan-Stora Mossen

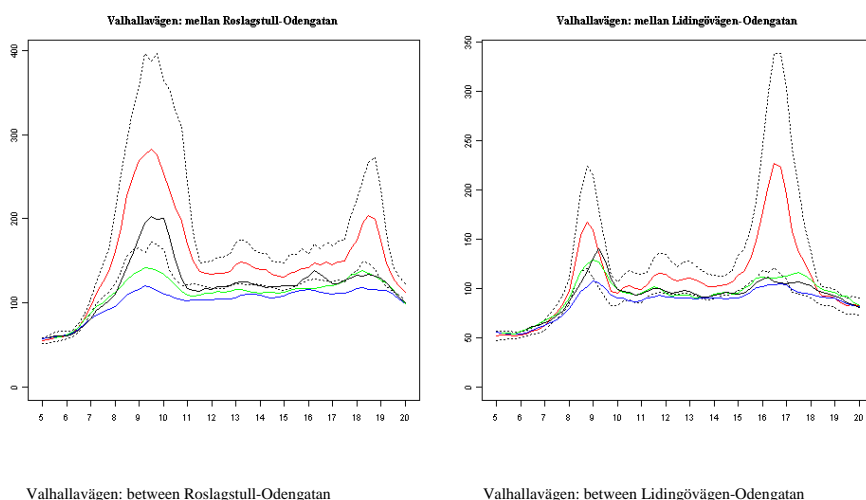


Figure 5. Some examples of travel times over a 24-hour period: Red = autumn, 2005; dotted line = 90/10 percentiles, autumn 2005; blue = weeks 2-5; green = weeks 6-8; black = weeks 10-13.

Car traffic and car-travel times - E4, Essingeleden, Södra Länken

Traffic effects described below relate to the period 6-24 March 2006. Thus, neither the February nor March periods include the winter-vacation week.

- **Car traffic on Essingeleden essentially unchanged compared to March 2005.**
- Car traffic on Essingeleden was slightly higher in March 2006 than in March 2005 (see table, below). The increase is within normal variations - traffic on Essingeleden varies by a few percent, up or down, from week to week. However, it may be the case that, in the long term, traffic will be seen to be a few percent higher than in 2005 - 1-4% depending on which monitoring sites are compared.

	Jan	Feb	Mar
Frösundabacke	-3%	3%	2%
Gröndalsbron (bridge)	1%	4%	4%
Tomtebodakurvan	1%	2%	1%
Södra Länken	20%	20%	19%
Södertäljevägen at Midsommarkransen	-4%	-1%	-2%

Figure 6. Percentage change in number of vehicle passages per 24-hour period on E4 and Södra Länken, 2006 compared to 2005.

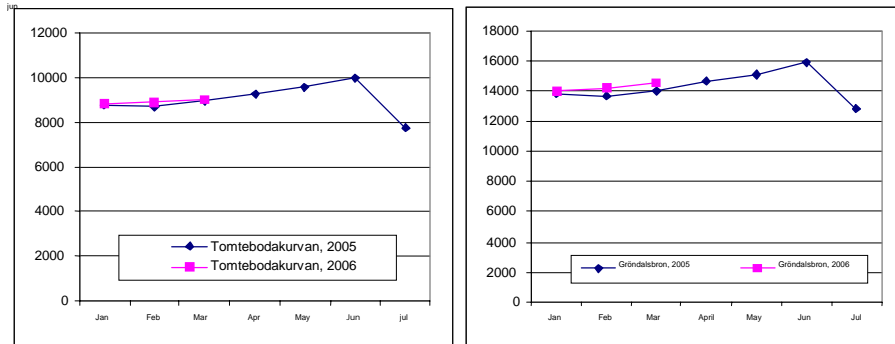


Figure 7. Number of vehicle passages per 24-hour period on Essingeleden, month-by-month, 2005 and 2006.

- Traffic on E4, north of the inner city (the table shows Frösundabacke), increased by 2-3%, while traffic south of the inner city (the table shows Södertäljevägen at Midsommarkransen) decreased by 1-2%, both in comparison with March 2005.

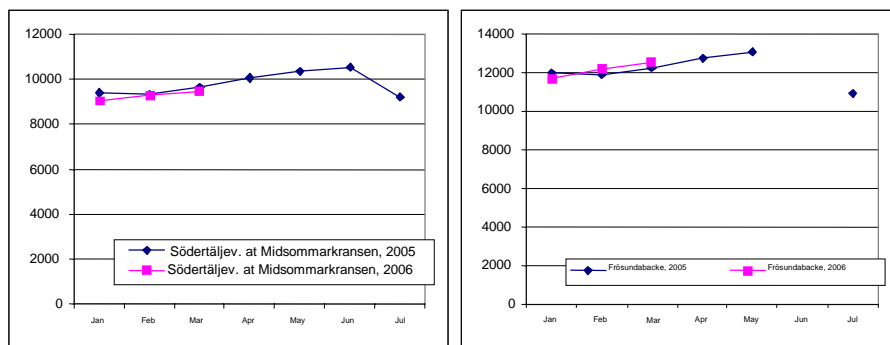


Figure 8. Number of vehicle passages per 24-hour period on E4 (south and north of the inner city, respectively), month-by-month, 2005 and 2006.

- **Travel times on Essingeleden basically unchanged compared to 2005**
 - The high level of congestion on Essingeleden means that travel times always vary greatly from week to week, even though traffic volumes are more or less unchanged. This variation makes it difficult to draw conclusions as to how travel times have changed compared to 2005. Generally speaking, travel times decrease slightly when the snow disappears and then increase during the spring, particularly during May-June.
 - In the mornings, congestion is concentrated to Essingeleden northwards and Södra Länken westwards, while in the afternoon/evening congestion is concentrated southwards and eastwards. Travel times on Essingeleden in these “worst directions” were practically unchanged compared to 2005 - somewhat shorter in February 2006 compared to February 2005 and somewhat longer in March 2006 compared to

March 2005 but these variations were probably due purely to chance since traffic volumes were fundamentally unchanged.

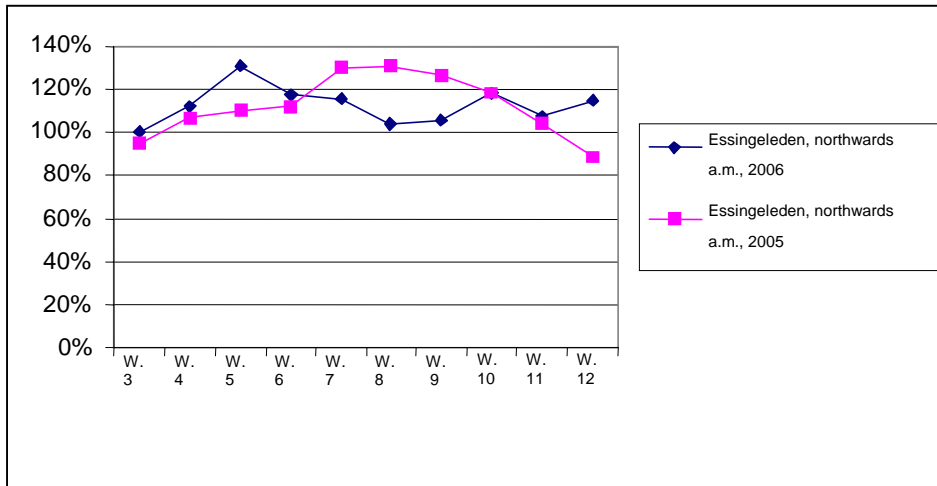


Figure 9. Travel-time prolongation in percent on Essingleden (7.30-9 a.m.), weekly average (moving mean value).

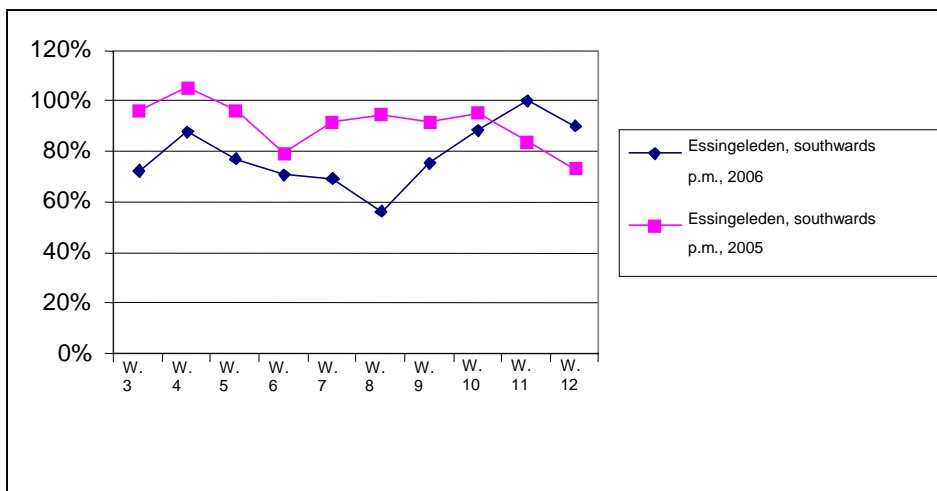


Figure 10. Travel-time prolongation in percent on Essingleden (3.30-6 p.m.), weekly average (moving mean value).

- **Traffic in Södra Länken increased compared to 2005 but it is impossible to determine how much of the increase was due to the congestion tax.**
 - Traffic in Södra Länken has continuously increased since it was opened in October 2004. For example, the increase during January-September 2005 was 17% (average of all monitoring sites).
 - It is impossible to determine to what degree the Södra Länken increase, compared to 2005, is due to the congestion tax since we do not know how much traffic would have increased without it. With the help of a time series, a reasonable estimate could be made if it was not for

an accident (causing lane closures) that disrupted traffic along the whole of the Södra Länken-Essingeleden- E4 corridor during October-December 2005.

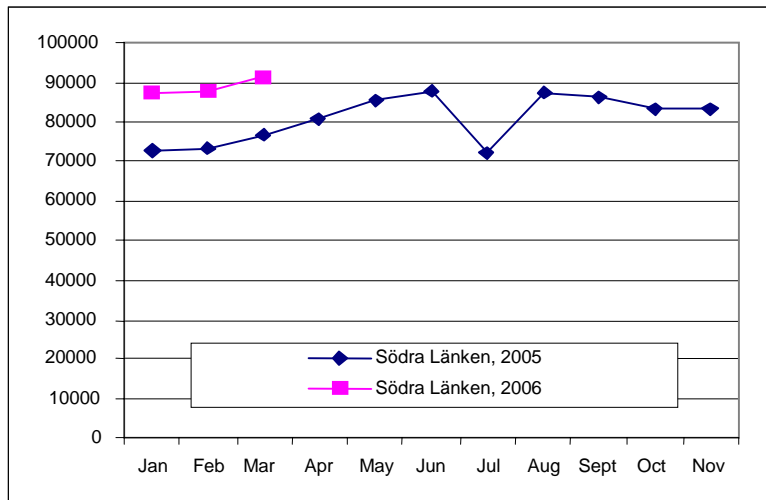


Figure 11. Number of vehicle passages per 24-hour period in Södra Länken, month-by-month, 2005 and 2006. Note: An accident disrupted traffic during October-December 2005.

- **The traffic increase in Södra Länken made afternoon/evening peak-period travel times there longer - but not in the morning peak period.**
 - Morning travel times in Södra Länken westwards are about the same as in 2005 despite the fact that traffic has strongly increased during the past year. However, travel times vary from week to week and since the congestion level is high the variation is also significant (see diagram below).

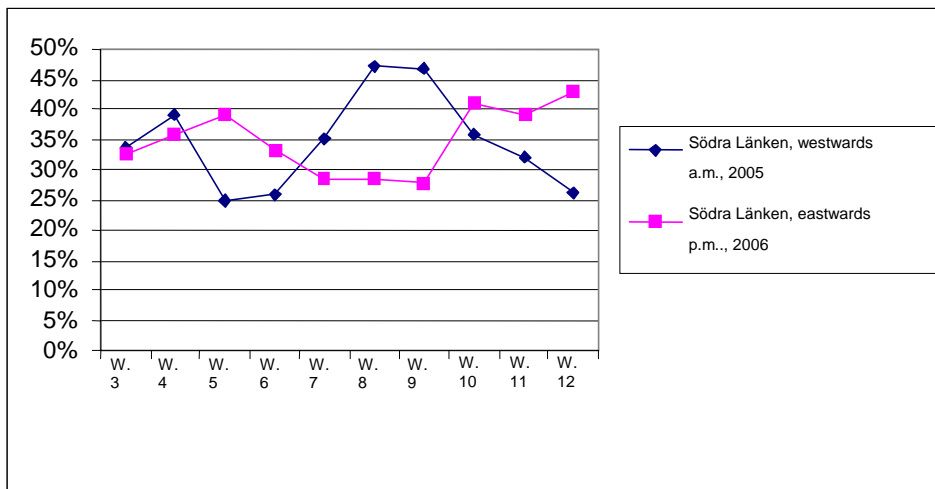


Figure 12. Travel-time prolongation in percent in Södra Länken (7.30-9 a.m.), weekly average (moving mean value).

- Travel times during the afternoon/evening in Södra Länken eastwards are longer than in 2005, probably due to the strong traffic increase during the past year. As mentioned earlier, it is practically impossible to say how much of the traffic increase is the result of the congestion tax and how much stems from the general traffic increase.

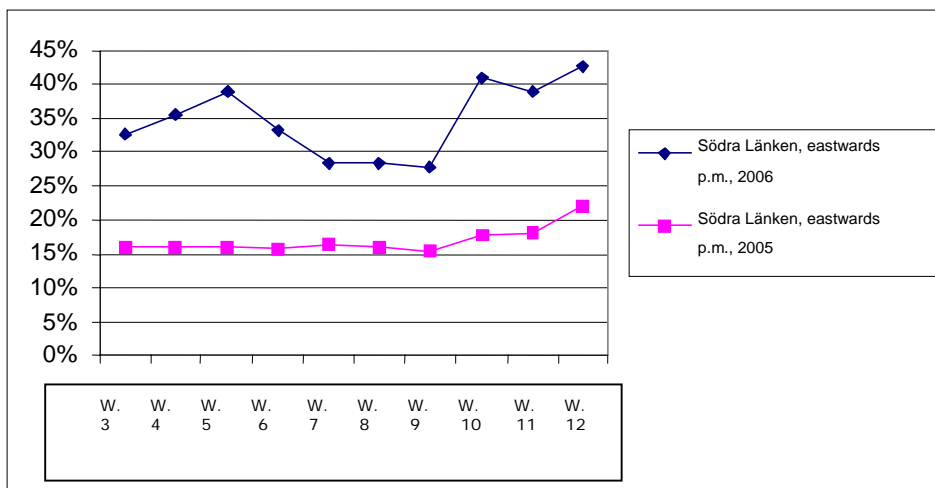


Figure 13. Travel-time prolongation in percent in Södra Länken (3.30-6 p.m.), weekly average (moving mean value).

A detailed account of travel times can be found in an appendix.

Public transport

- **The number of public-transport passages to/from the inner city increased by nearly 50,000 compared to March 2005.**
 - According to measurements conducted by Stockholm Transport (SL), there were 46,000 additional passages per day to/from the inner city, an increase of 6%, equivalent to about 22,000 additional passengers. However, only part of this increase is due to the effects of the congestion tax.
 - For SL traffic as a whole, the number of passengers boarding per day rose by 165,000, a 7% increase.
 - The number of standing passengers on the red and blue Underground routes was slightly higher than in March 2005 but significantly lower than during autumn 2005.
 - These increases have not been adjusted to take account of the fact that four of the winter-vacation days and the Easter holiday fell in March 2005 while only three winter-vacation days fell in March 2006.
 - During the period January-March 2006 SL sold about 30,000 more monthly travel cards per month compared with the same period 2005. However, sales of monthly travel cards increased even in 2005 and each year are usually higher in March than in December and January. Account must be taken of these factors in order to draw conclusions concerning the share of the increase resulting from the introduction of the congestion tax. If the expected trend increase is taken into consideration, it would appear that each month during the first quarter of the Stockholm Trial SL sold about 10,000 more monthly travel cards than anticipated.

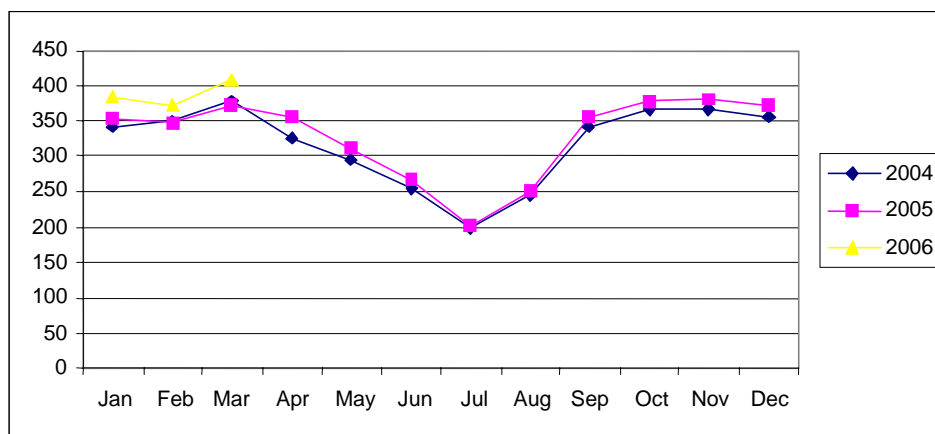


Figure 14: Sales of SL 30-day travel cards per month (in thousands).

Parking

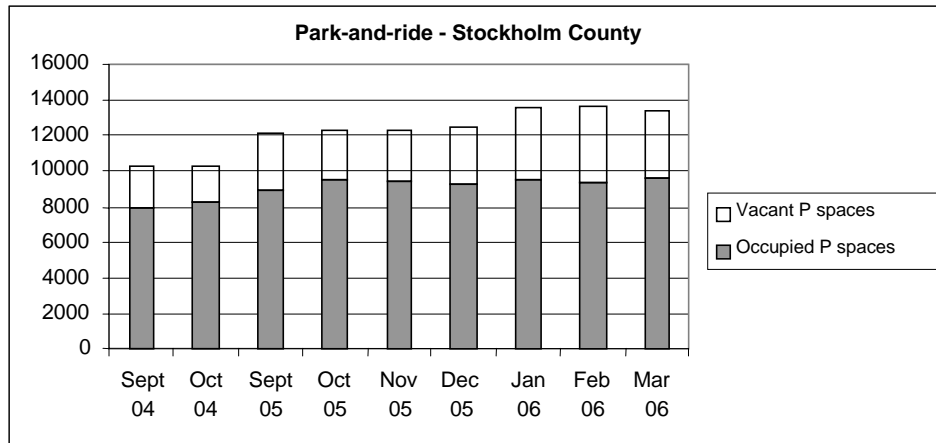


Figure 15. Park-and-ride in Stockholm County. Vacant and occupied parking spaces.

- Within the framework of the Stockholm Trial, the number of park-and-ride spaces was increased. Between autumn 2004 and autumn 2005, 2,000 new spaces were added. This appears to have led to increased use of park-and-ride sites - in Stockholm County, about 1,000 more cars were parked each day at park-and-ride sites in autumn 2005 than in autumn 2004.
- In Stockholm County as a whole, there does not appear to have been any further increase in the use of park-and-ride sites after year-end 2005/06, despite the congestion tax and a further 1,000 or so new park-and-ride spaces. The number of parked cars at park-and-ride sites is almost exactly the same if October-December 2005 is compared to January-March 2006 (about 9,400).
- However, the situation regarding the use of park-and-ride sites in Stockholm City is different: During January-March 2006 the number of cars parked at park-and-ride sites increased by about 20% (400-500 cars) compared to September-October 2005. At the same time as the congestion tax was introduced, the number of park-and-ride spaces increased by 800 (up by about 25%) so it is not possible to distinguish between the effects of the congestion tax and additional spaces. Moreover, the possibility that some of these cars were earlier parked at park-and-ride sites at other locations in Stockholm County cannot be excluded.

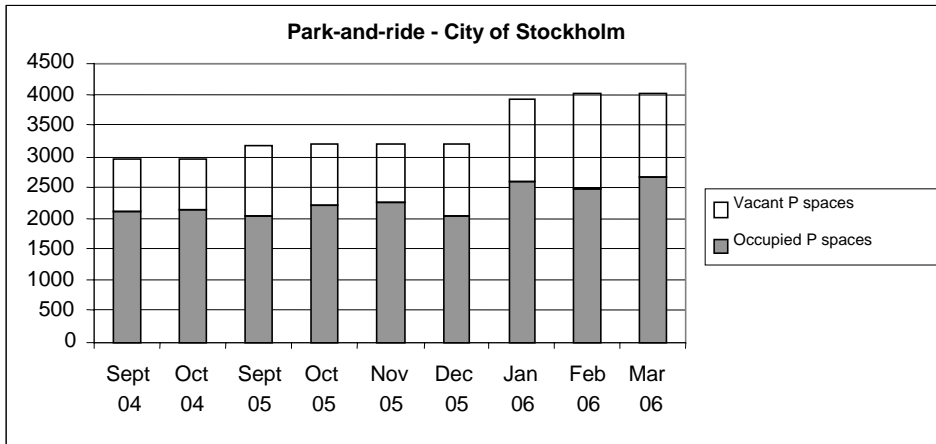


Figure 16. Park-and-ride in Stockholm City. Vacant and occupied parking spaces.

- In Nacka Municipality, too, the number of cars parked at park-and-ride sites increased. The increase between September-December 2005 and January-March 2006 was about 70 cars, or more than 10% (it is thus not a question of large volumes). A partial explanation is probably an increase in park-and-ride spaces by 140 (20%).

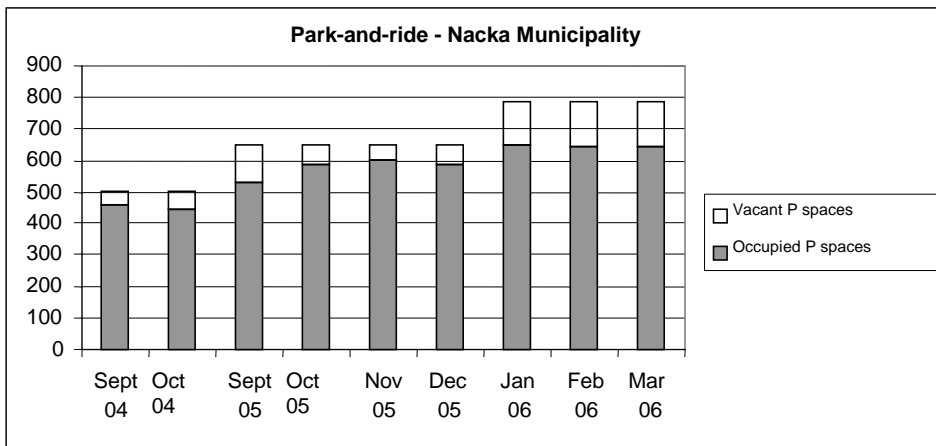


Figure 17. Park-and-ride in Nacka Municipality. Vacant and occupied parking spaces.

Opinions and attitudes

- **The number of Stockholm County citizens who said there is a problem with car-traffic congestion to, from or in the inner city during the charging period decreased significantly compared to the period prior to the introduction of the congestion tax.**
 - The number of Stockholm County citizens who said there are *big* problems decreased strongly while the number who said there are *no* problems increased strongly.
 - The number of Stockholm County citizens who answered “don’t know” to the question “How big is the congestion problem” increased from 10% to 30%. This is hardly surprising since the traffic situation has changed radically since the Stockholm Trial began and it is reasonable to assume that a large number of citizens have not had time to test the new arrangement.
 - If autumn 2005 and February/March 2006¹ are compared, it is seen that the number of Stockholm County citizens who said there are big problems with road congestion to, from or in the inner city decreased by about two-thirds.
 - If autumn 2005 and February/March 2006² are compared, it is seen that the number of Stockholm County citizens who think there are no problems with road congestion to, from or in the inner city approximately trebled.

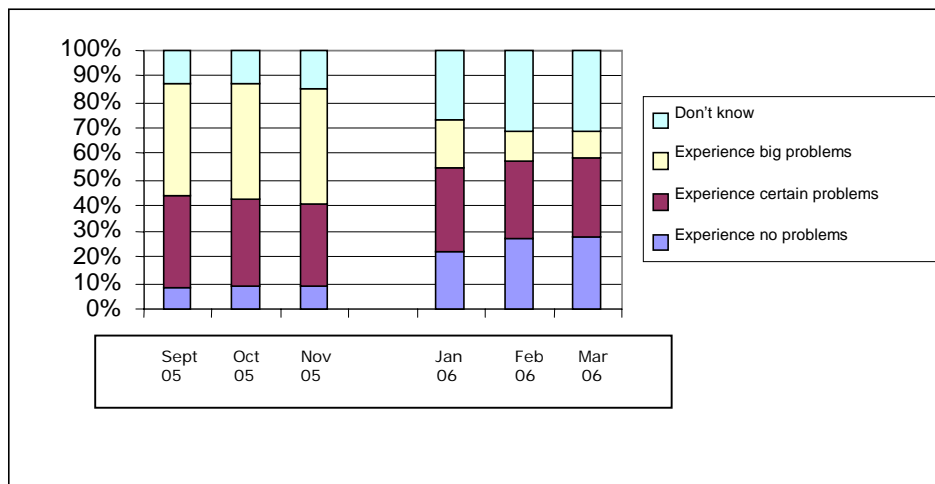


Figure 18. Number of Stockholm County citizens who said there are problems with road congestion to, from or in Stockholm’s inner city during weekdays between 6.30 a.m. and 6.30 p.m.

- Among those who travelled by car over the charging cordon during the *most recent two weekdays*, the pattern was the same and the changes statistically significant. The number of respondents, however, was so small (about 100 per month) that no reliable conclusions can be drawn about the size of the change. With that reservation, it can

¹ The exact decrease depends on how the “don’t knows” are treated. If “don’t knows” are excluded, the number of Stockholm County citizens who said there are big congestion problems decreases from about 50% during autumn 2005 to 25% in January 2006, 17% in February and 14% in March. If “don’t knows” are included, the figures are 45% during autumn 2005, 19% in January 2006, 12% in February and 11% in March.

² Here, too, the exact decrease depends on how the “don’t knows” are treated. If “don’t knows” are excluded, the number of Stockholm County citizens who said there are no congestion problems increases from about 10% during autumn 2005 to 31% in January 2006, 39% in February and 41% in March. If “don’t knows” are included, the figures are 9% during autumn 2005, 23% in January 2006, 27% in February and 28% in March.

anyway be noted that the number of persons in the group who said that congestion is a big problem has been approximately halved (from 30-40% in autumn 2005 to 10-20% in January-March 2006), while the number of persons who said congestion is not a problem approximately doubled (from 10-15% in autumn 2005 to 30-40% in January-March 2006).

- **A larger number of people now say it was a good decision to conduct the congestion-tax trial.**
 - The number of respondents among all Stockholm County citizens who said it was a “rather/very bad decision” to conduct the congestion-tax trial has, since the introduction of the congestion tax in January 2006, fallen continuously compared to autumn 2005, when the figure was always about 55%. In March 2006, for the first time, more respondents said it was a “rather/very good decision” than those who said it was a “bad decision” (49% for “good decision” compared to “42%” for “bad decision” among all Stockholm County respondents). The change is statistically significant.
 - Those who said it was a “bad decision” were, so to speak, more convinced of their views - a larger number said “very bad” than those who said “very good”.
 - Among those who travelled by car to/from the inner city in the charging period during the most recent two weekdays, the majority said it was a “bad decision” but the number of respondents who were negative decreased (significantly) in March 2006, from over 60% in January-February to 53% in March. The number of respondents in the group that answered “good decision” increased from about 35% in January-February 2006 to about 42% in March. Although the selection was small, the change is significant.
 - Among those who live in the inner city¹ a majority said it was a good decision (60% for “good decision” compared to 35% for “bad decision”). The pattern has been about the same since the Stockholm Trial began but during autumn 2005 a majority said it was a “bad decision” (over 50% for “bad decision” compared to about 40% for “good decision”).

- Among those who live outside the inner city, there was for the first time an approximately even balance between “bad decision” (44%) and “good decision” (46%); earlier there was a majority for “bad decision” (52% for “bad decision” compared to 39% for “good decision” in January-February 2006).

¹ About one-third of the population of the City of Stockholm live in the inner city, the remainder living in the western suburbs or south of the Södermalm district.

- Note that the question was formulated to concern whether it was a good or bad idea to conduct the Stockholm Trial, not whether Stockholm should have the congestion tax in the future.

Retail market

- It is still too early to comment on whether the congestion tax has affected the inner-city retail market since that requires longer time series and more statistics. The congestion tax may have had both negative and positive effects on individual retailers but it is too early to comment on the overall effect on the inner-city retail market.
- The city sales index shows that sales at city department stores and chain stores contacted increased slightly during February 2006 compared to February 2005.
- Indicators for the clothing trade for February 2006 show, both for Stockholm City and Stockholm County, an increase compared to February 2005 that is higher than the 5% national average.
- In connection with the ongoing review of the effect of environmental fees on the retail market in the Stockholm region, the Swedish Research Institute of Trade (HUI) is collecting its own data. This covers shopping centres and department stores throughout the charging zone. HUI's more extensive review indicates the same trend as the sales indexes presented as monthly indicators but it is too early to comment on the final result for February 2006. HUI will revert to this matter in June 2006.
- In HUI's review, a tendency can be seen in January and February 2006 that shopping centre and mall sales in Stockholm districts outside Stockholm City - Kungsholmen and Södermalm, for example - grew more rapidly than sales in Stockholm City itself, which should imply that the Stockholm City sales index slightly underestimates inner-city retail sales as a whole.
- The strong increase between 2005 and 2006 seems to be primarily due to the fact that February 2005, the comparative month, was a poor month from a retail-market perspective.

- Other partial explanations for the strong retail-market increase since year-end 2005/06 are that households' disposable incomes have risen strongly as a result of tax cuts, increased childrens' allowances and continued wage increases combined with low inflation and continued low interest rates. This is starting to show in retail-market consumption.
- Several of the participating stores included in the city sales index are currently carrying out building extensions/renovations and/or have vacant premises. The sales index is based on information from selected companies and the extent to which restructuring influences the sales index depends on how significant the revenues of the companies in question are for the overall figures.
- One factor suggesting that the effect of the congestion tax on Stockholm inner-city retail trade is relatively limited is that inner-city consumers use cars in connection with shopping only to a moderate extent. Both the travel-habits survey carried out by Stockholm County in 2004 and HUI's consumer surveys from 2004 and 2006 support this statement and indicate instead that shopping trips to the inner city during the charging period are mainly made via public transport.