

The Stockholm Congestion Charging Trial

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Presentation outline

- Setting the scene
- How was the trial designed?
- How did the system work?
- What were the effects?
- How was the system received by the public?
- What happened afterwards?

Stockholm traffic planning problems



Severe traffic congestion

Population expansion

Economic growth

Physical constraints:

Water

Protected areas

Suggested solutions

- Traffic infrastructure investment
 - Road links
 - Ring road completion
 - Bypasses
 - Public transportation improvements
 - Rail capacity increase
- Traffic management
 - Improved traffic signal systems
 - Motorway control systems
 - Incident management

Congestion charging



Another problem...



Stockholm local politicians



All they could agree on...

Before elections 2002:

No congestion charging if we win - I promise!



No congestion charging if we win - I promise!

Stockholm local politicians

It is not always easy to be a politician...

Before elections 2002:

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Stockholm local politicians

After elections 2002:



FOTO: YVONNE ÅSELL

Sweden national politicians

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After elections 2002:

My price to support the left:
congestion charging!



Sweden national politicians

It is not always easy to be a politician...

After elections 2002:



Stockholm local politicians

After elections 2002:

My price to support the left:
congestion charging!



Congestion charging?
Let's try!

Sweden national politicians

It is not always easy to be a politician...

After elections 2002:

I did what I could...



You betrayed us!

Stockholm local politicians

After elections 2002:

My price to support the left:
congestion charging!



Congestion charging?

Let's try!

Sweden national politicians

The congestion charge – a tax!

- Regional or local government not authorised to introduce a congestion fee
- National decision
- Regulated by law
- Executive responsibility - the National Road Administration

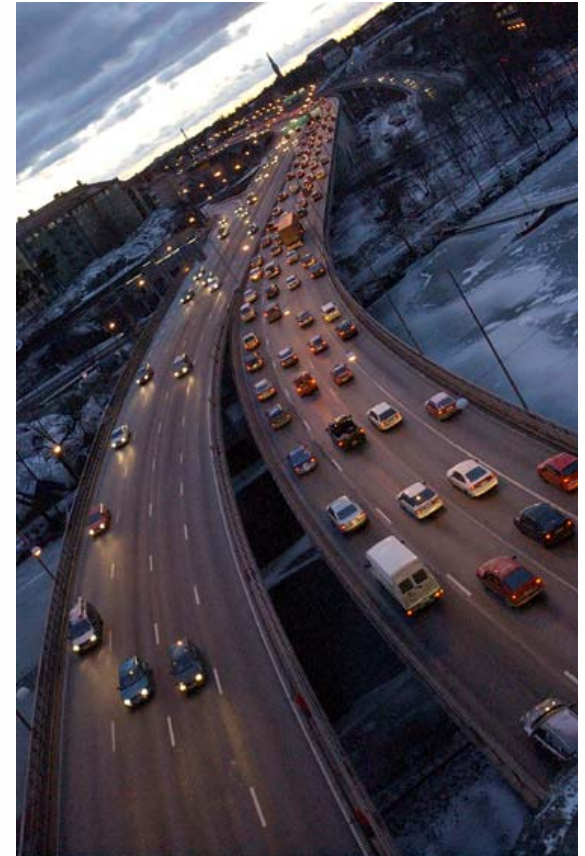
The trial - objectives

- Reduce traffic volumes by 10-15% on the most congested roads
- Increase the average speed
- Reduce emissions of pollutants harmful to human health and of carbon dioxide
- Improve the urban environment as perceived by Stockholm residents

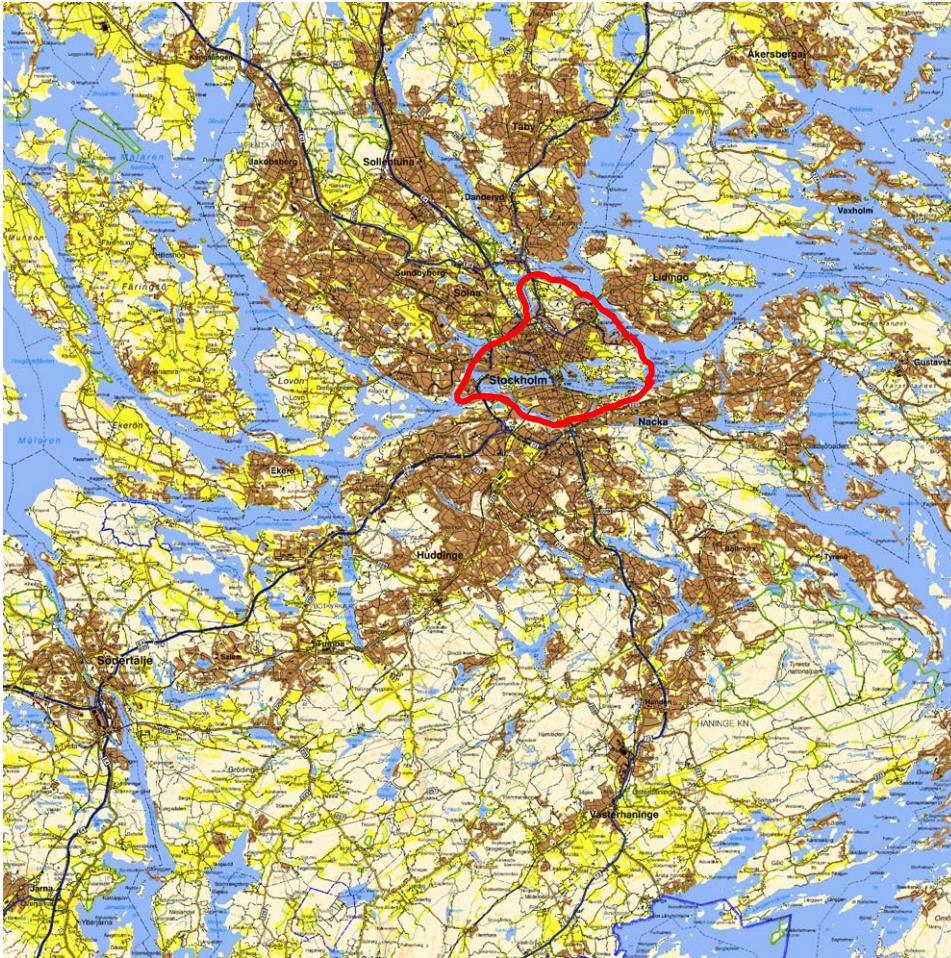


The Stockholm trial design

1. Improved public transport
(Aug 2005 - Dec 2006)
2. Park & Ride facilities
(Aug 2005 -)
3. Congestion charging
(Jan - July 2006)



Stockholm County



County area 6500 km²

Charging zone 47 km²

City of Stockholm 770 000
inhabitants

Charging zone 280 000
inhabitants

County 1.9 millions
inhabitants

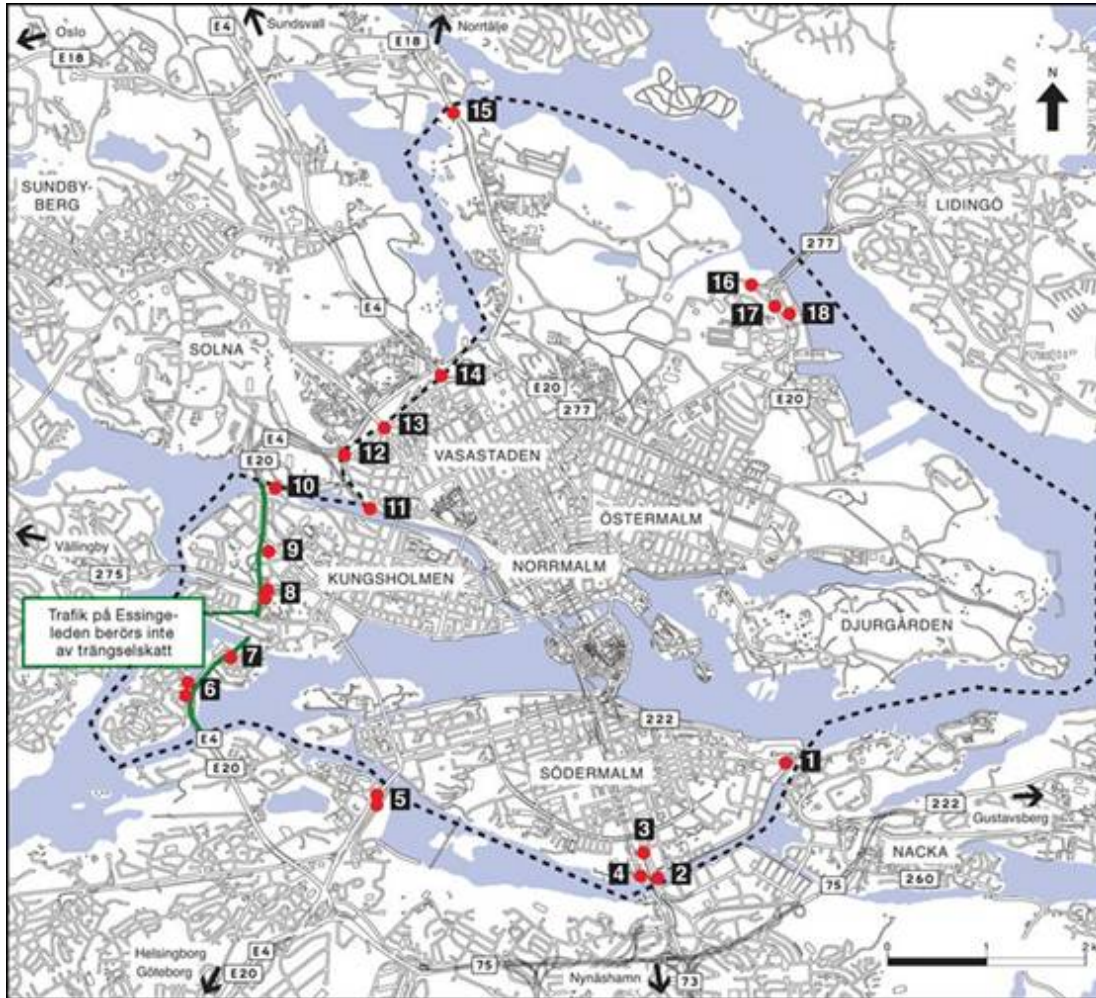
Improved Public Transport

From 22 August 2005

- 14 new express bus lines
- 18 bus lines with extended service
- 197 new buses
- Improvements of rail-bound lines
- 1800 new park-and-ride places
- New bus lanes, bus stops

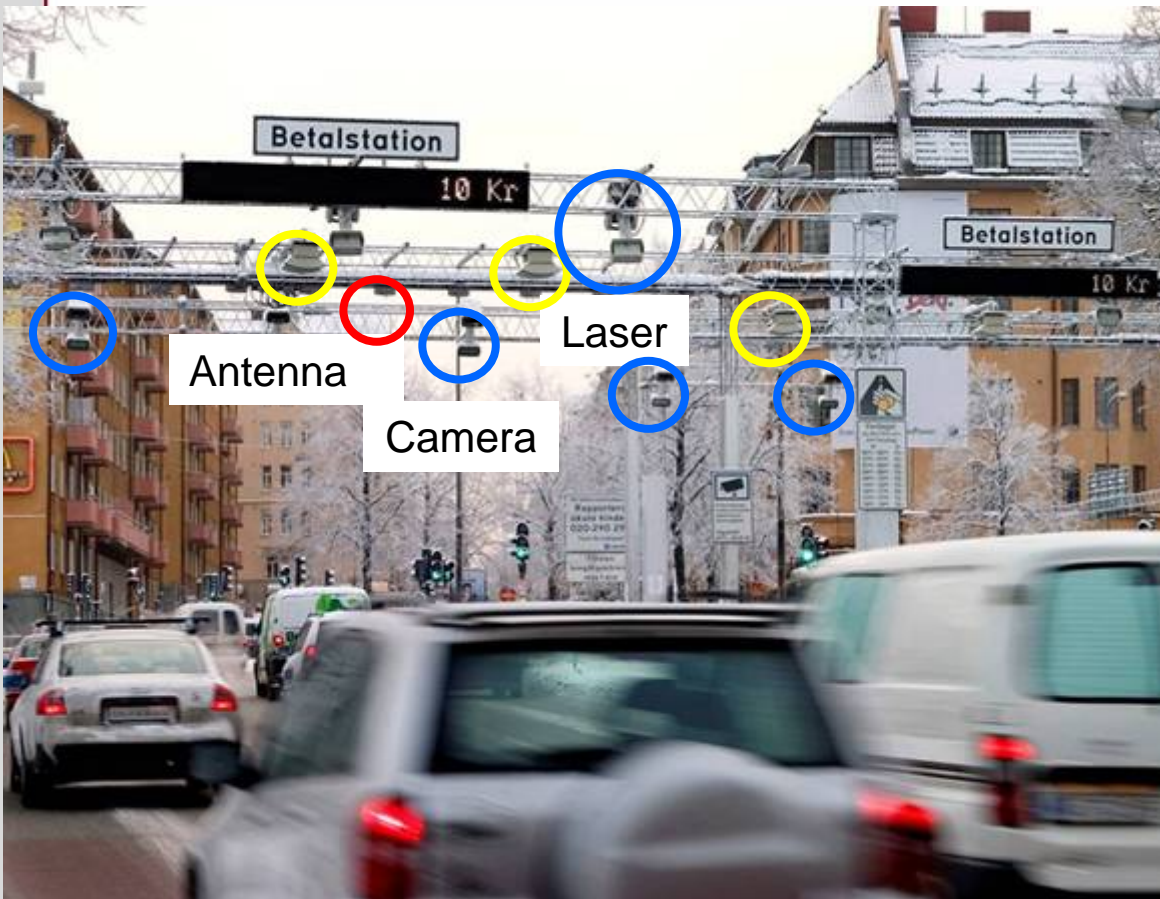


Charging cordon



- 18 charging points
- charge on entry and exit
- E4/E20 bypass free

No barriers, no stops, no roadside payments



- Current fee shown on control point display
- Automatic identification. License plates were photographed
- A limited part of the car was shown on photograph – people and objects inside the car cannot be seen

Identification mainly through Onboard units (OBU)



Total number of
onboard units
distributed
approx. 423 000

OBU 48.4 %
OCR¹⁾ 41.8%
MCR²⁾ 9.8%

1) Photos, 2) Manual recognition

Congestion charges and times

PEAK PERIODS

7.30-8.30 a.m., 4-5.30 p.m. SEK 20 EUR 2

SEMI PEAK PERIODS

7.-7.30 a.m., 8.30-9 a.m.

3.30-4 p.m., 5.30-6 p.m. SEK 15 EUR 1.5

MEDIUM-VOLUME PERIODS

6.30-7 a.m., 9 a.m.-3.30 p.m.

6-6.30 p.m. SEK 10 EUR 1

MAXIMUM CHARGE PER DAY: SEK 60 EUR 6

Evenings, Saturdays, Sundays, holidays: NO CHARGE

Payment



- Tax decision made each day
- Payment due in 14 days
- Payment options
 - Seven-Eleven shops, Stationary shops 22 %
 - Bank/post office
 - Internet, by credit card or Internet account
 - Automatic debiting on specified account (transponder users) 65 %

- Ⓜ Aktuellt
- Ⓜ Om Stockholmsförsoket
- Ⓜ Fakta om Stockholm och trafiken
- Ⓜ Kollektivtrafik
- Ⓜ Infartsparkering
- Ⓜ Miljöavgifter/trängselskatt
- Ⓜ Utvärdering och mätningar
- Ⓜ Folkomröstning
- Ⓜ Frågor & Svar
- Ⓜ Kundtjänst
- Ⓜ Pressrum
- Ⓜ Informationsmaterial

Vägverket

Vägverkets startsida > Stockholmsförsokets startsida > English Inlogget fordon: **MLB123** Logga ut

Översikt > Vissa mina skattebeslut > Beställ avgifter & transponder > Kontakta Kundtjänst

Mina skattebeslut

Fordonsägare: **KALLE KARLSSON** Owner
 Registreringscar: **MLB123** Number plate

Sammanlagd skeld: 0,00 kr
 Total debt

Du har begärt ut ett registerutdrag avseende uppgifter om trängselskatt. Varje skattebeslut måste betalas var för sig. Du betalar till Vägverkets konton för trängselskatt PlusGiro 06 46 15-0 eller till Bankgiro 5053-0765. Ange på meddelanderaden fordonets registreringsnummer och skattebeslutsdatum (passagedag), t.ex. så här: MLB 318 2006-01-03. [Läs mer om betalning här](#) >

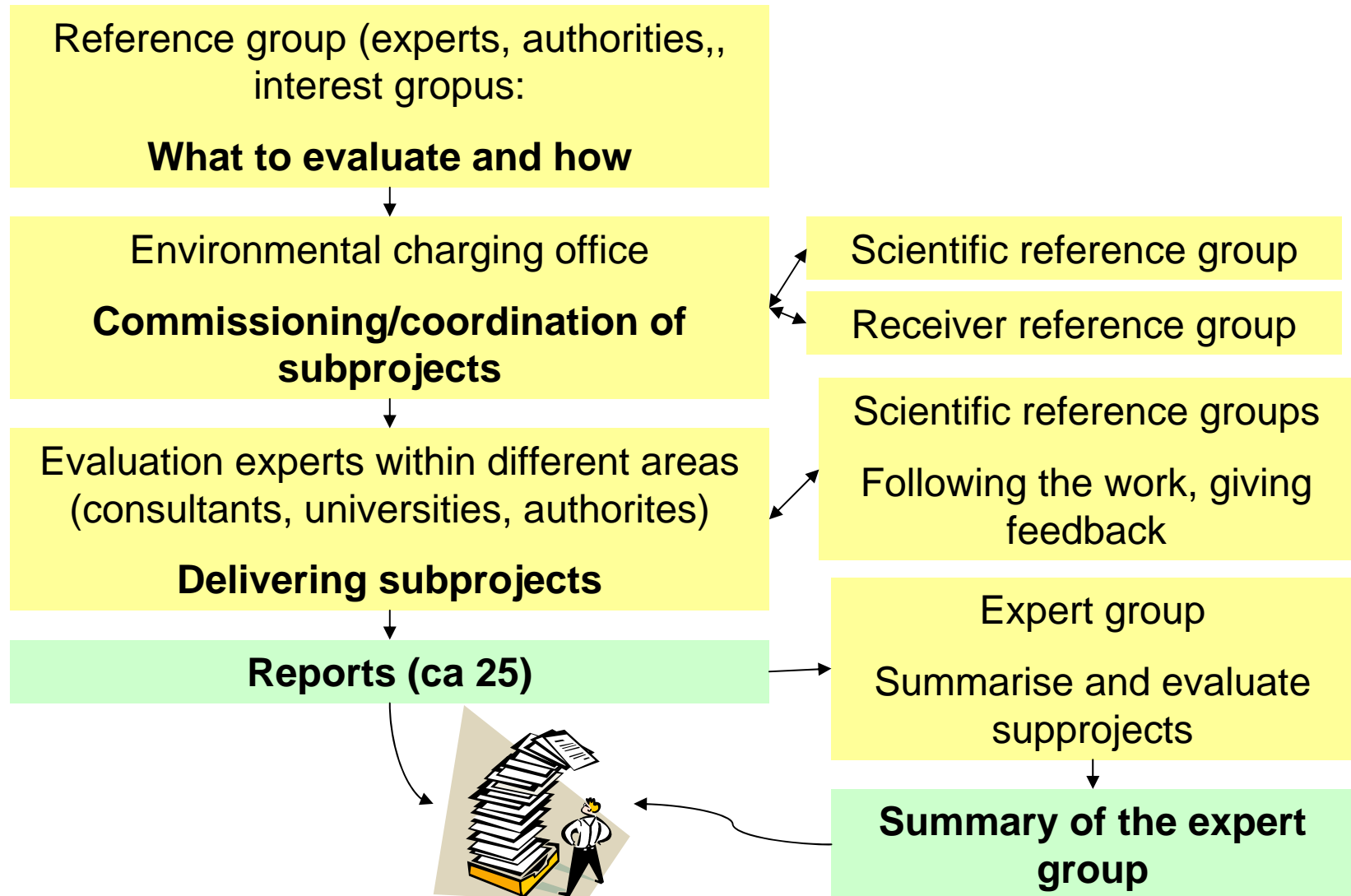
Date	Due date	Status	Total amount	Balance due	
Skattebesluts-datum >	Förfallodatum >	Status >	Totalt belopp kr >	Återstående belopp kr >	Kommentar
2006-02-20	2006-02-27	● Betald	20,00	0,00	
2006-02-08	2006-02-13	● Betald	45,00	0,00	
2006-01-19	2006-01-24	● Betald	20,00	0,00	
2006-01-15	2006-01-23	● Betald	20,00	0,00	
2006-01-12	2006-01-17	● Betald	10,00	0,00	
2006-01-09	2006-01-16	● Betald	30,00	0,00	

Aktörer i Stockholmsförsoket är Stockholms stad, Vägverket och SL.

An average weekday in May

Passages	371 300
Tax decisions	115 100
Reminder 1	6 300
Reminder 2	1 500
Appeals to the tax authority	100
Court appeals	5
Tax income	SEK 3 060 000
Number of calls to customer services	2 200
System availability	99.9 percent

Trial evaluation - organisation



Evaluation tasks



- Car Traffic
- Public transport
- Stockholm county travel survey
- Business and economic impacts
 - Retail sales, contractors, taxi, transport services etc
- Environment and health effects
- Effects on regional economy
- Other studied effects
 - Traffic safety, noise, attitudes, events affecting the evaluation programme
- Cost benefit analysis

Evaluation programme

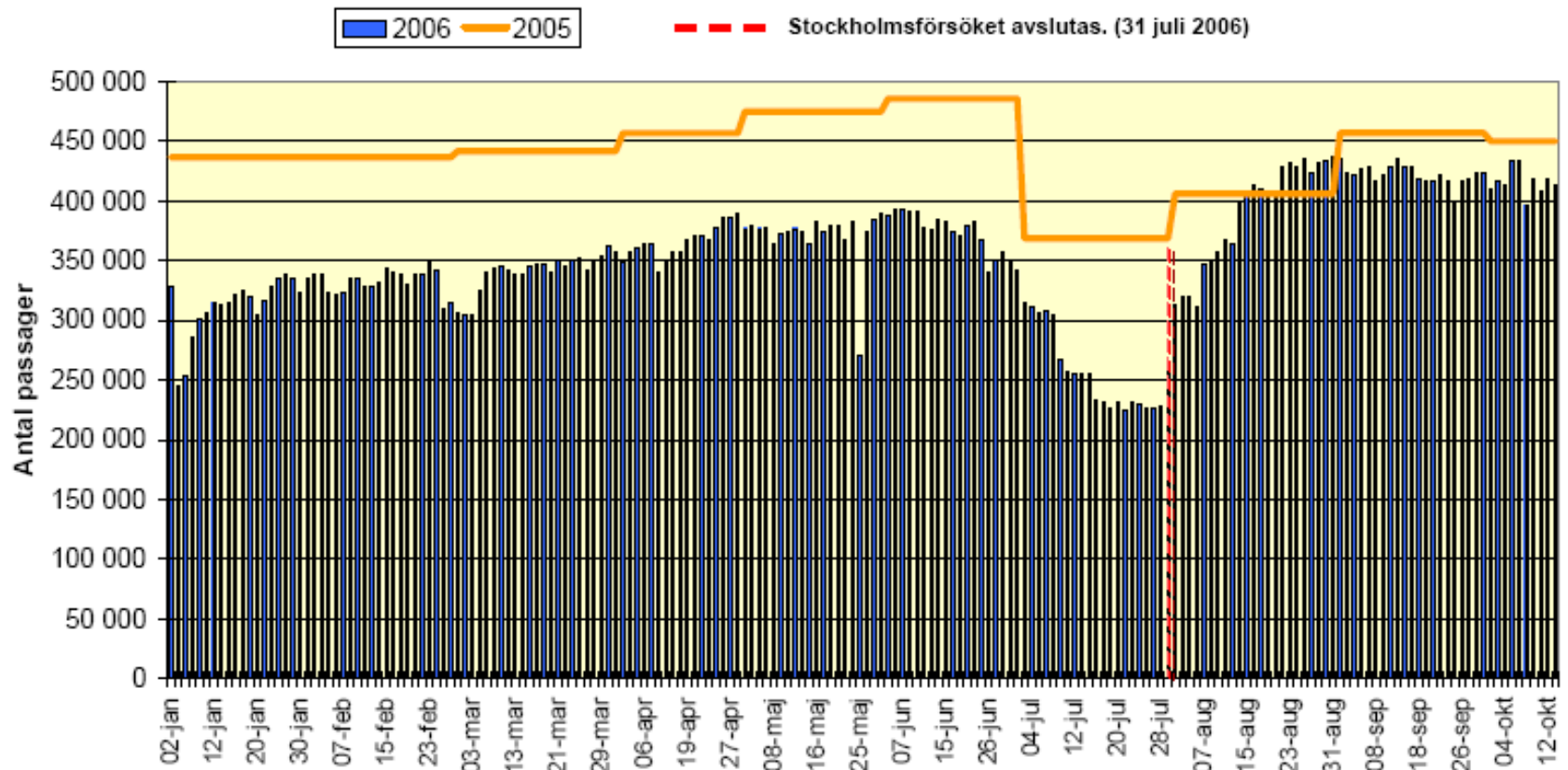
- **Evaluation of the Stockholm trial objectives**
 - Complete analysis (25 evaluation projects)
 - (Before) autumn 2004 (spring 2005)
 - (During) spring 2006
- **Monthly indicators - monitor changes over time**
 - Selected indicators
 - Monthly indicators starting in October 2005, ends September 2006
- **“Go live” - effects after introduction**
 - Selected indicators
 - Daily starting the 3 January 2006 during the first 2 weeks of the congestion charging

Traffic effects

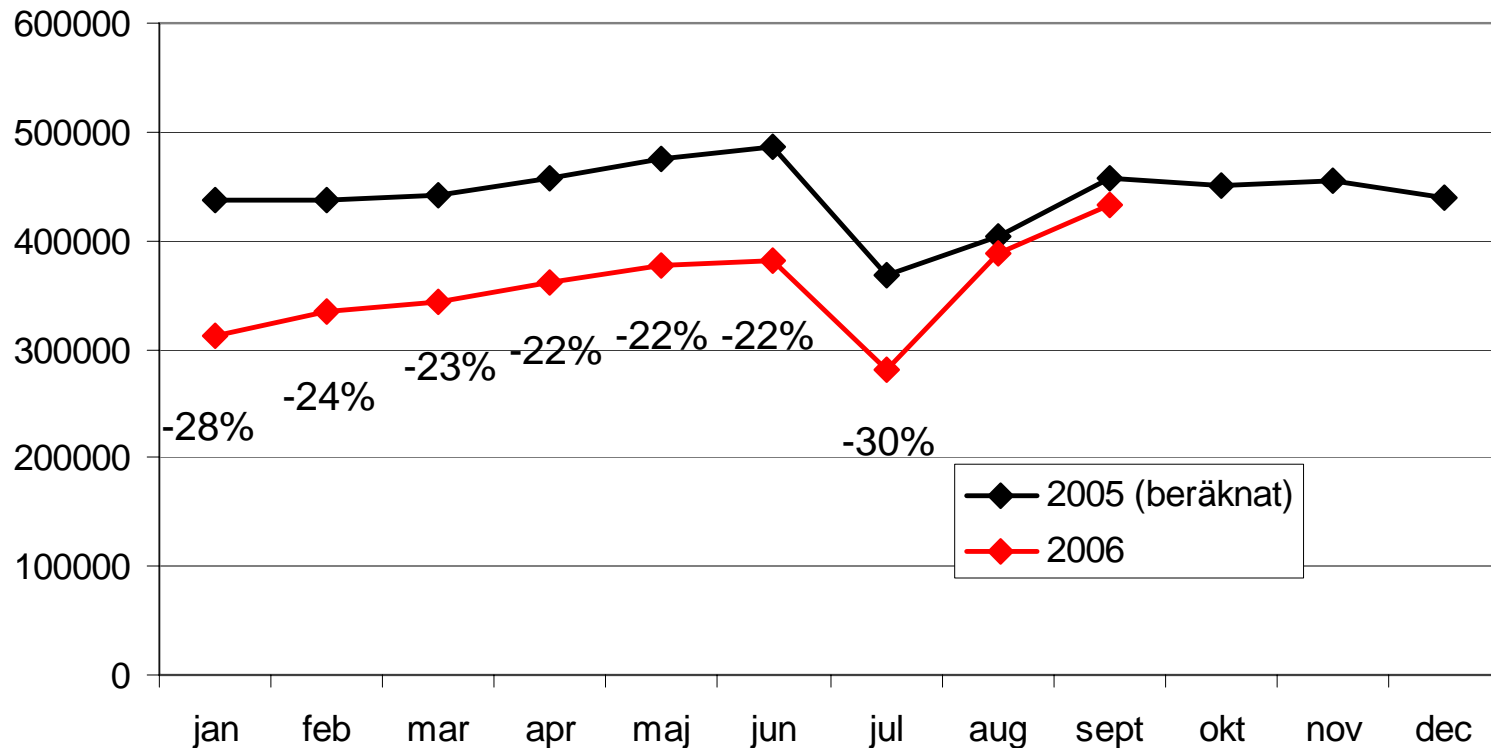
Every 4th car disappeared!



Passages in/out of congestion charging zone 06:00 – 19:00



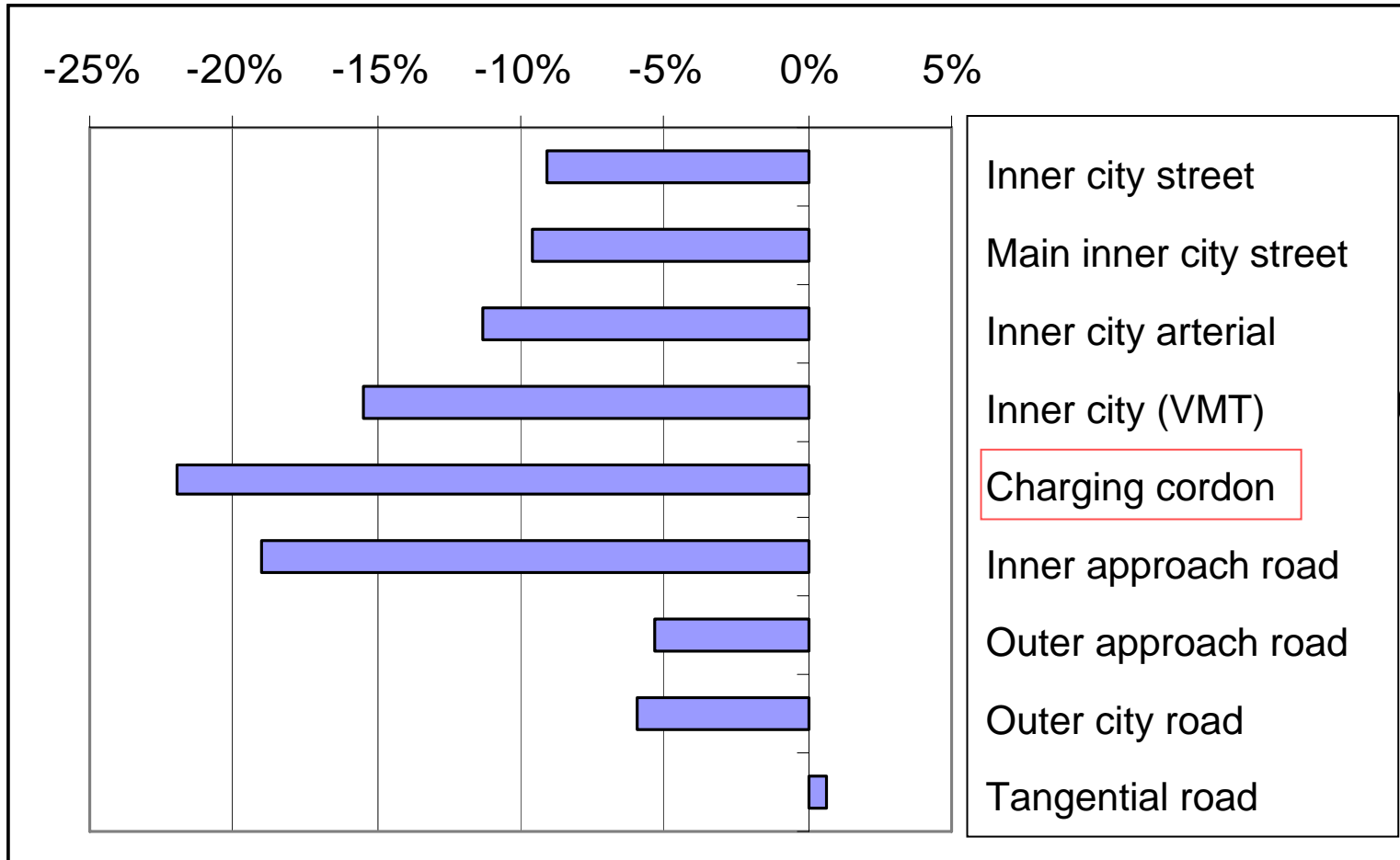
Passages in/out of congestion charging zone 06:00 – 19:00



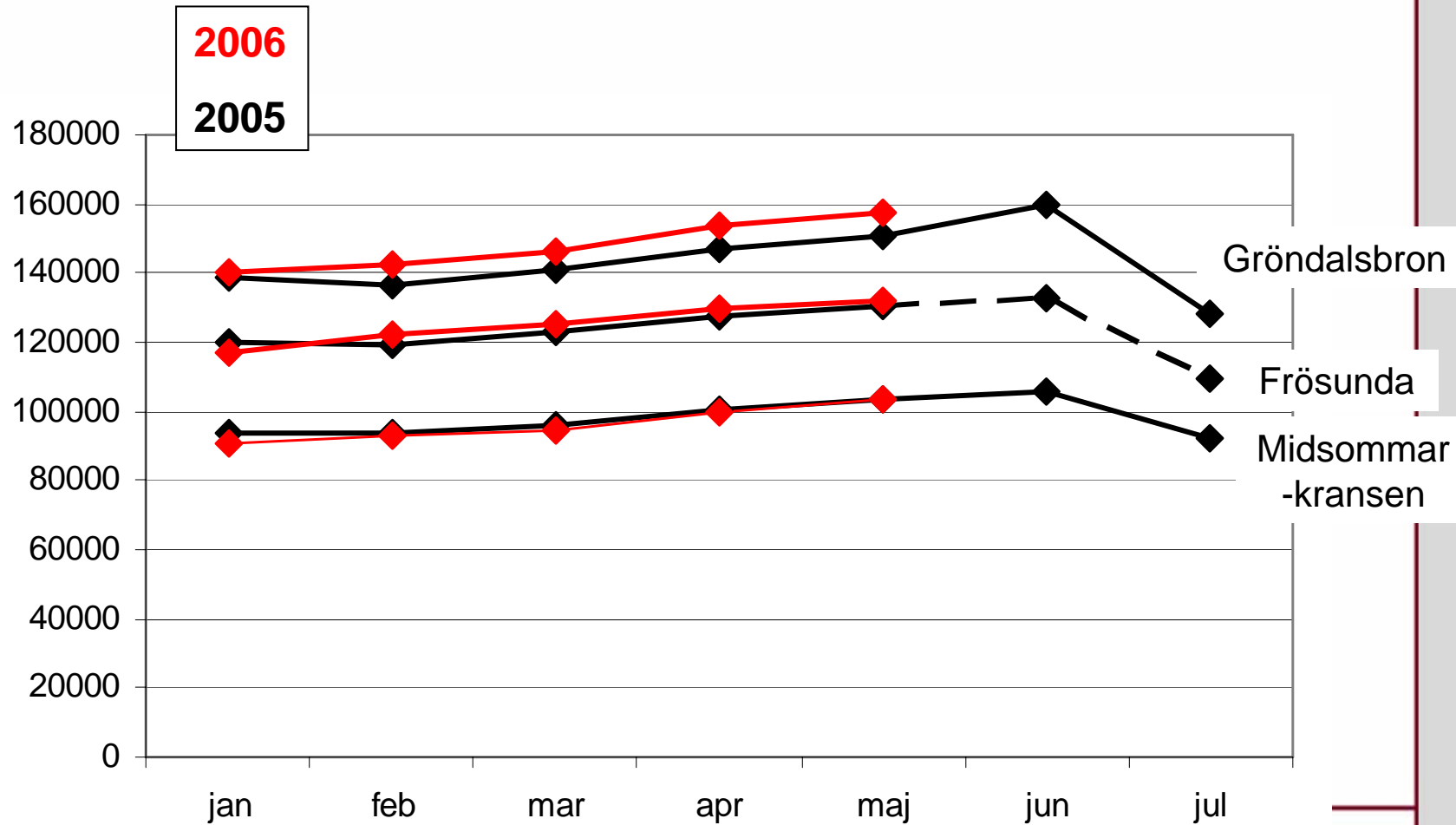
Changes by vehicle type (charged period)

Vehicle type	Number	Change
Car	- 89 200	- 30 %
Light truck	- 10 100	- 22 %
Truck	- 1 500	- 13 %
Motorcycle	- 500	- 54 %
Total	- 101 313	- 28 %

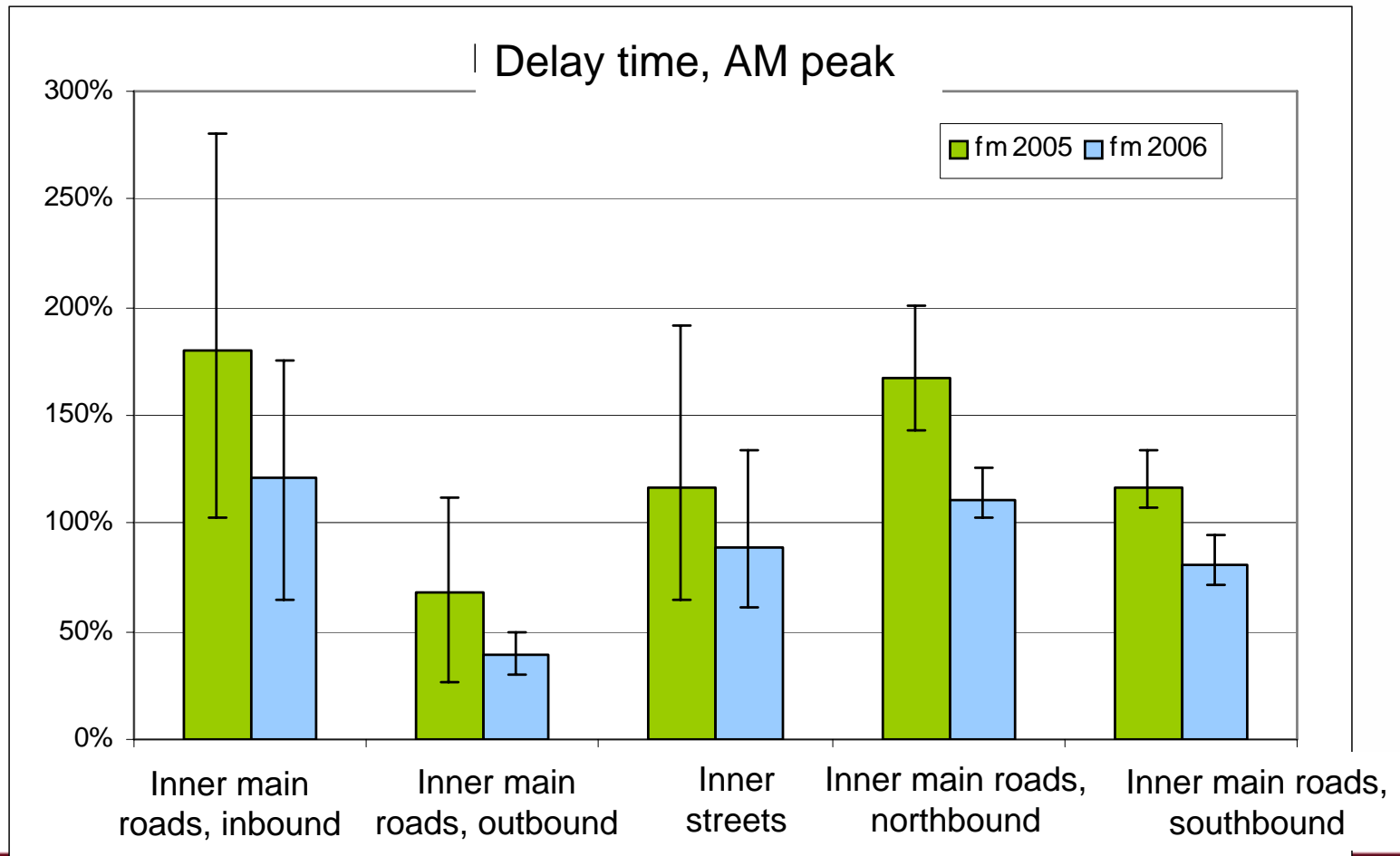
Less traffic also inside and further outside the zone



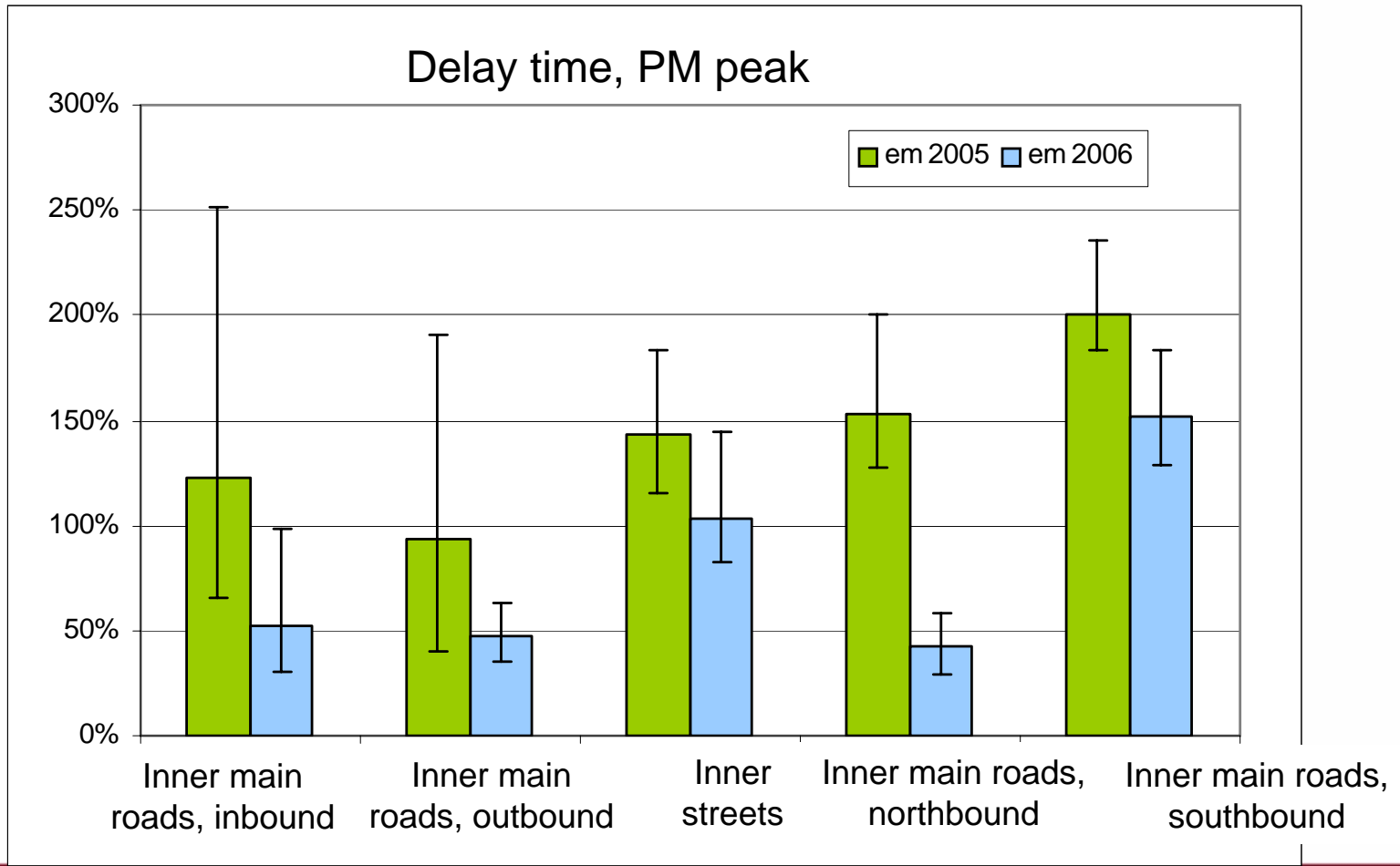
Smaller effect than expected on E4-Essingeleden bypass



30-50% less time in queues

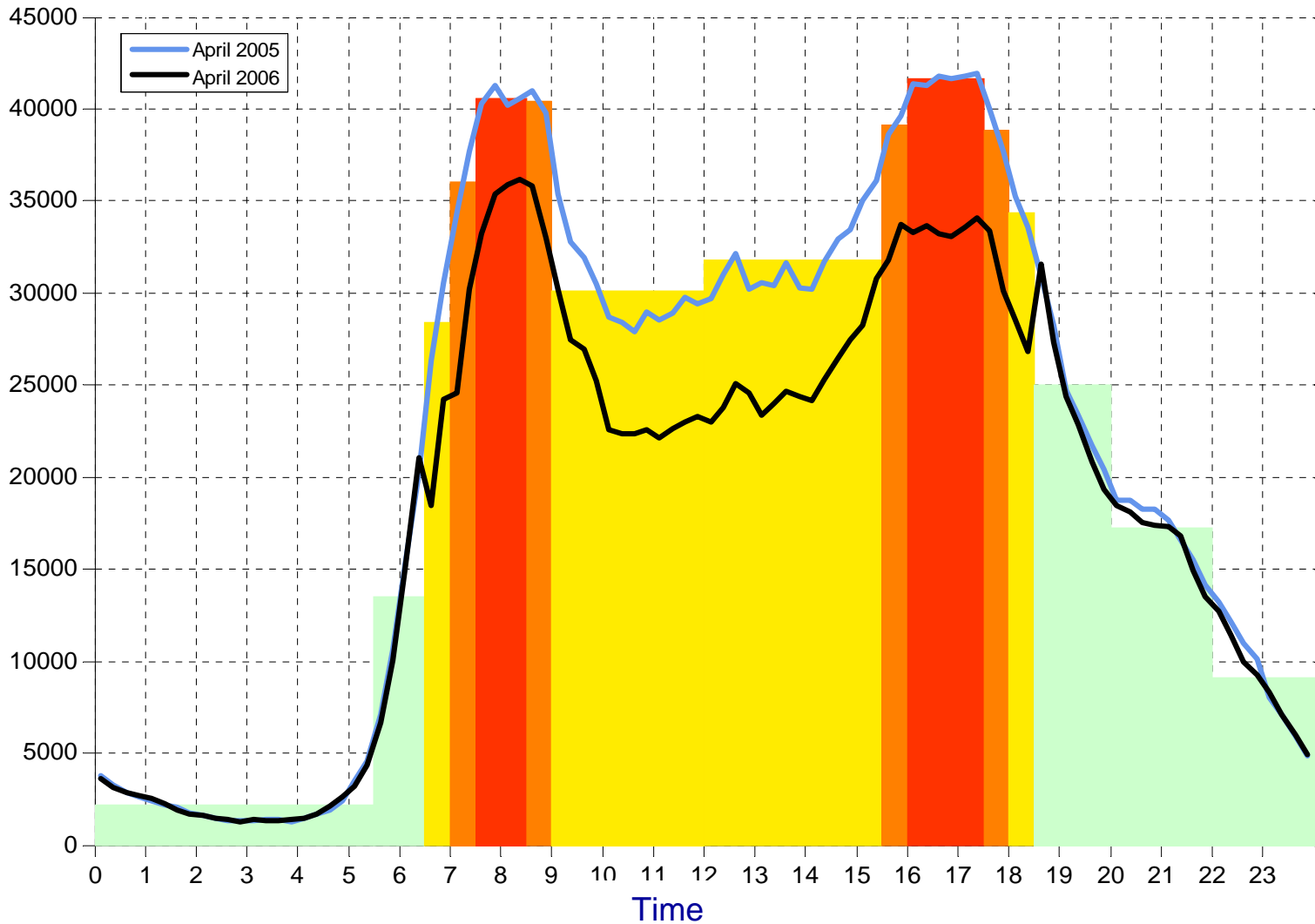


Even larger effect on PM peak



Passages in/out of the congestion charging zone

Vehicles/h

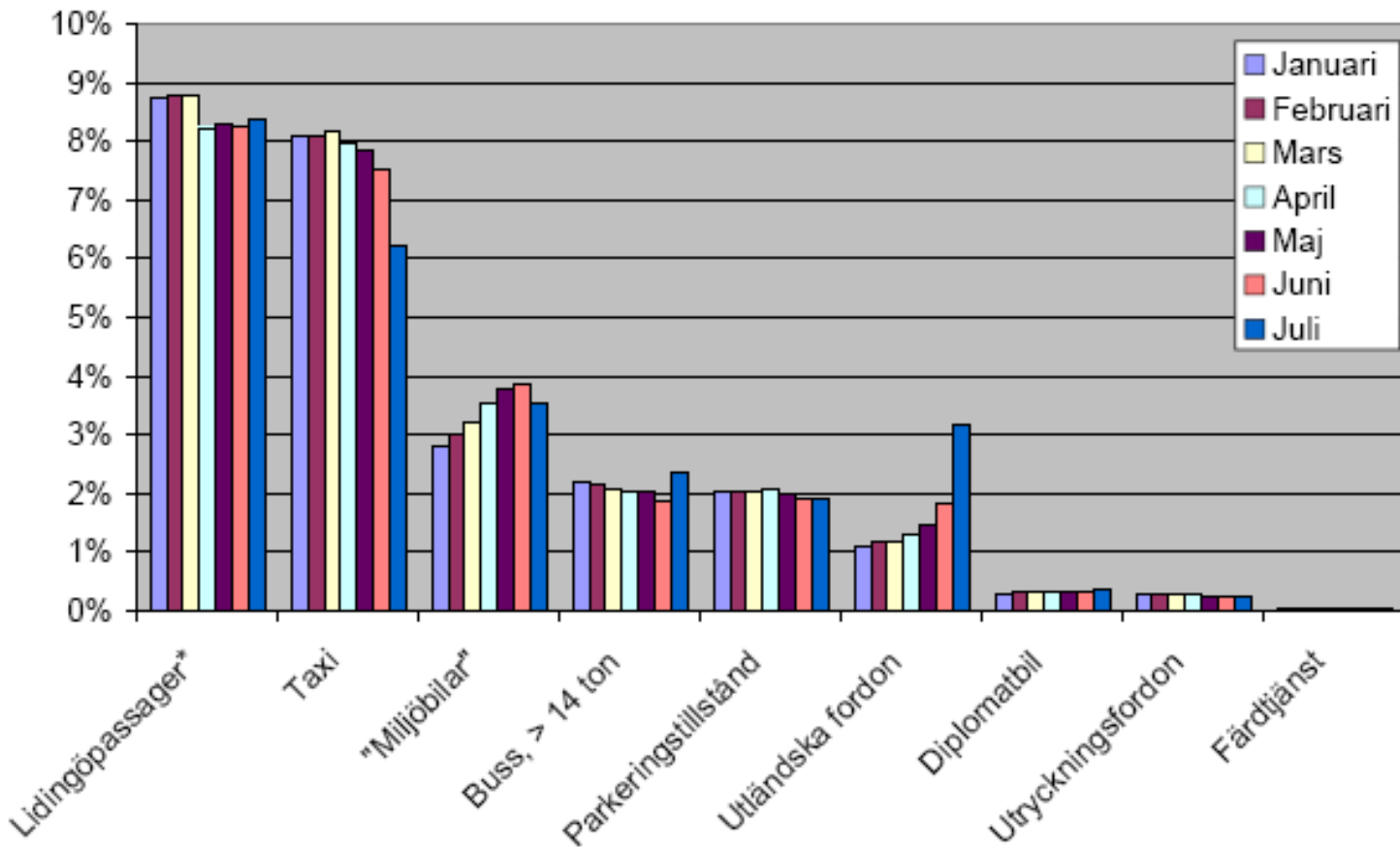


These traffic categories were exempted:

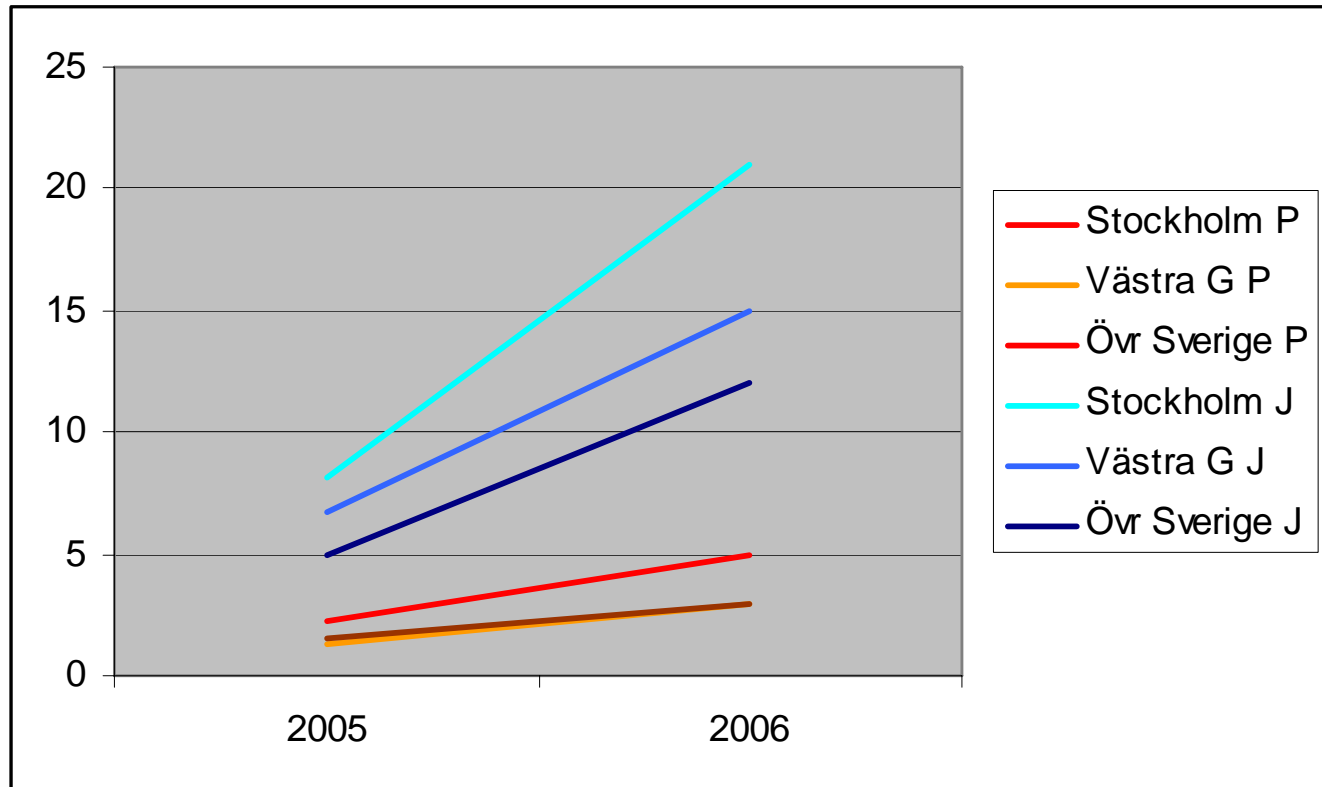
- Vehicles from Lidingö passing through within 30 minutes
- Taxis
- Emergency vehicles
- Vehicles with disability permits
- Foreign vehicles
- Transport services for disabled
- Motorcycles
- Buses over 14 tons
- Vehicles using alternative fuel



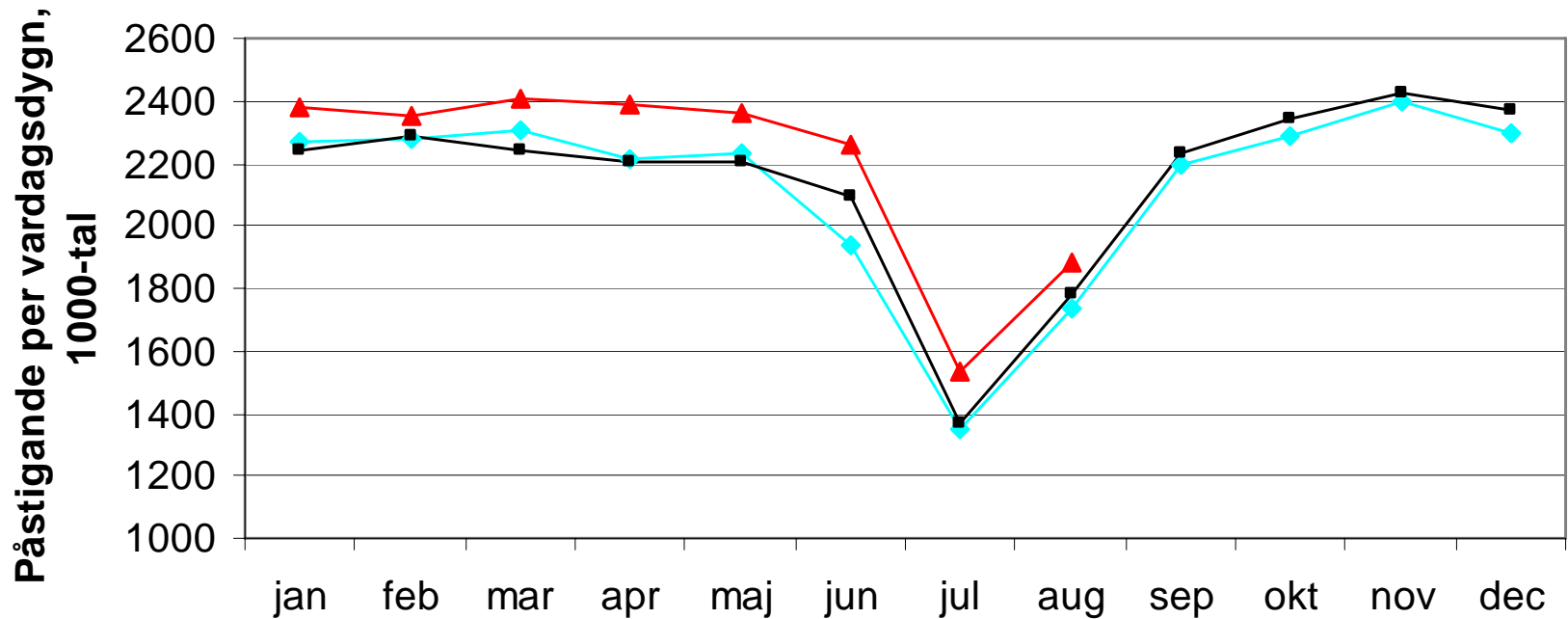
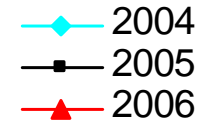
30 percent exempted passages



Share of alternatively fuelled vehicles for 2005 and 2006 by region and type of buyer



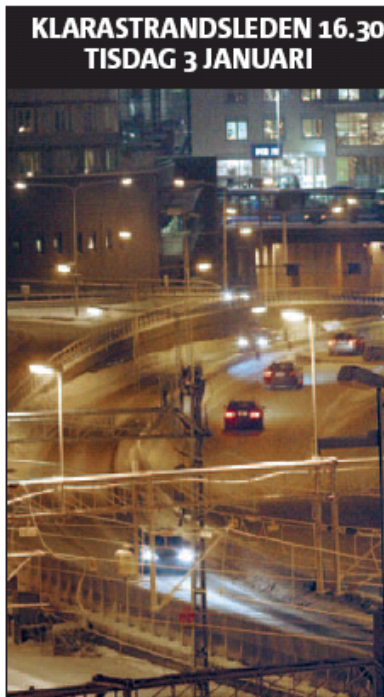
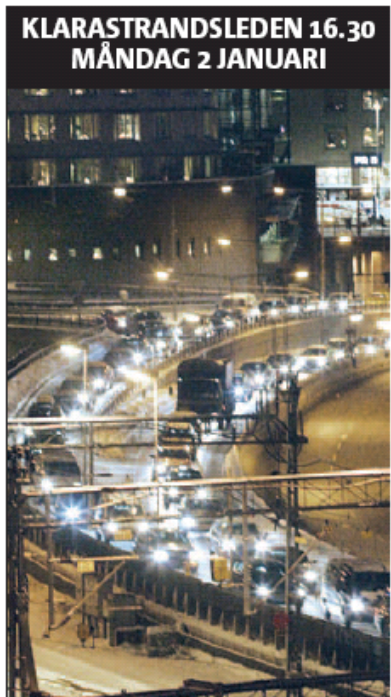
Total public transport trips



Public transport

- About 5% more public transport passengers, but average crowding about the same
- The public transport extensions did not reduce car traffic
- Improved driving conditions for bus traffic
- The additional park-and-ride facilities were used
- Travellers were satisfied with the direct bus lines

Where did all the drivers go, just simply vanishing...?



LUGNT PÅ KLARASTRANDSLEDEN. Lugnt på Essingeleden. Lugnt i kollektivtrafiken. Ingen visste i går med säkerhet vart stockholmarna tagit vägen.

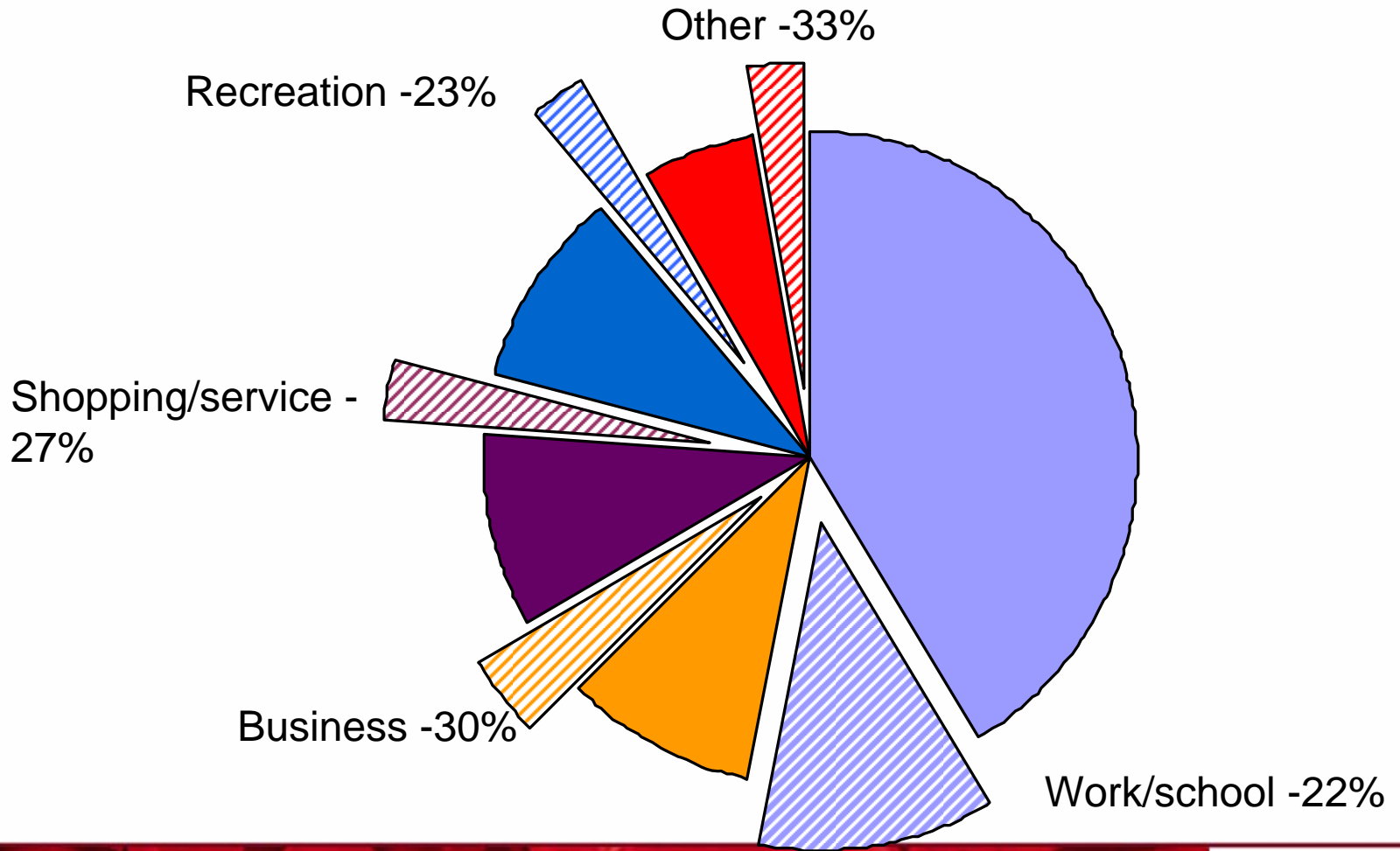
Stockholmarna, vart tog ni vägen?

Many different adaptation strategies

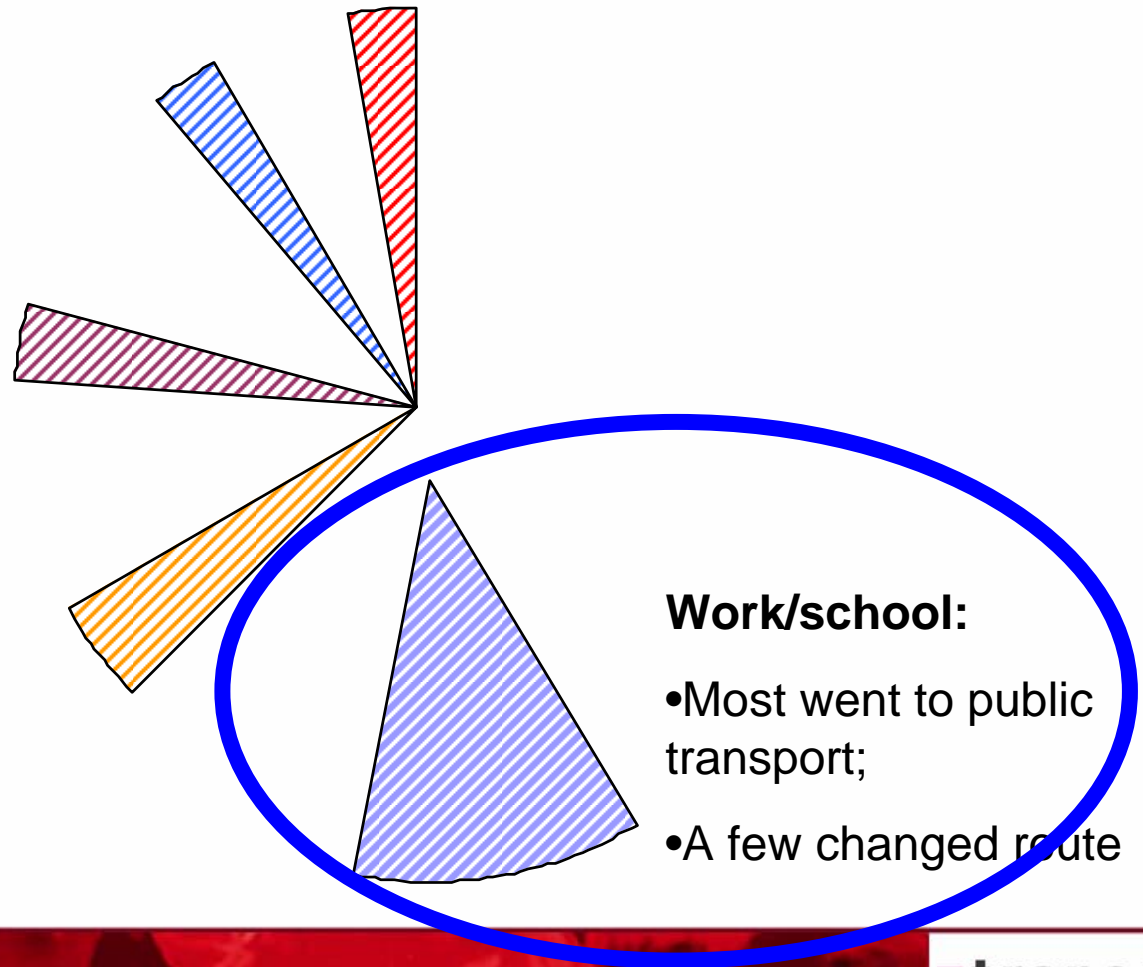
- Several different ways to change travel pattern:
 - Change mode
 - Change route
 - Change destination
 - Trip chaining
- About half of the car trips shifted to public transport
- New park & ride facilities were used – but a small contribution
- Changed departure times not a large effect



What car trips "disappeared"?

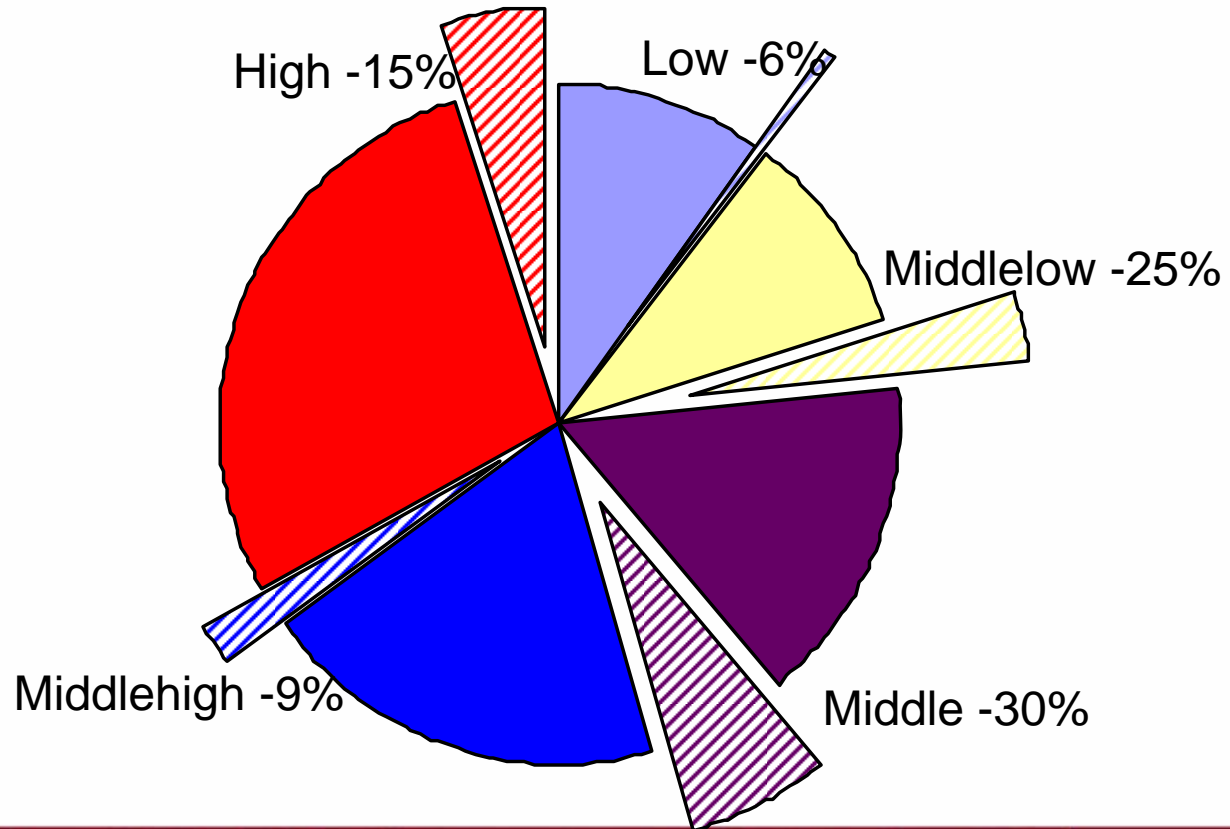


What car trips "disappeared"?



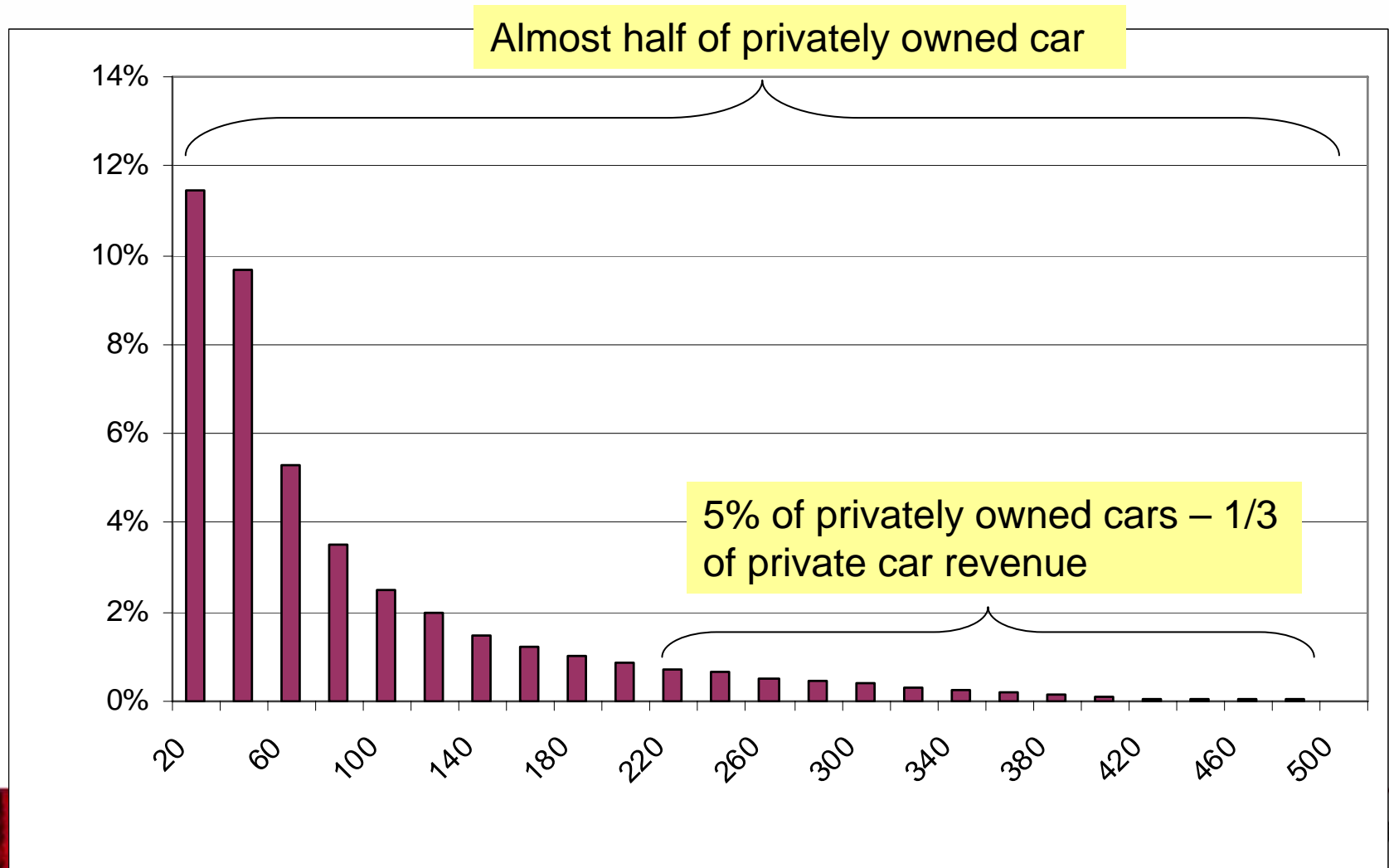
High income earners largest group affected
– Middle income earners show largest change

Car trips during charged hours with origin/destination in inner city



How many pay – and how much?

Fees paid in a 2 week period



Who pays most?

- Inner city and Lidingö inhabitants pay twice as much as others
- "Rich" households pay almost three times as much as "poor" households
- Working persons pay about three times as much as others
- Men pay almost twice as much as women

Traffic effects summary

- 20-25 percent less cars on congestion cordon
- 14 percent less mileage in charged area
- 1 percent less mileage outside charged area
- 30 – 50 percent delay time decrease
- Travel time variation decrease

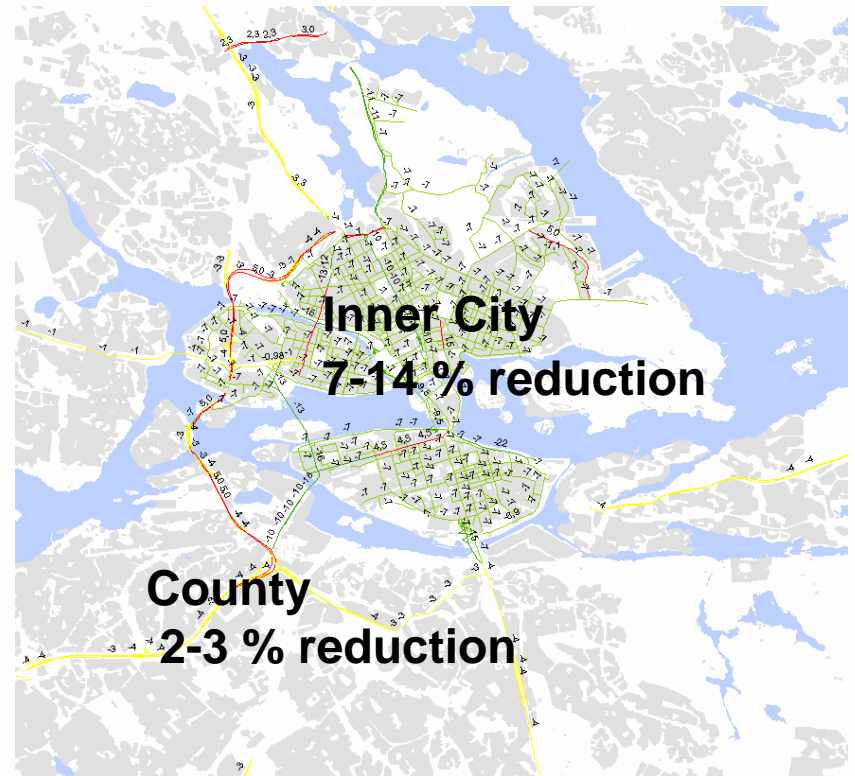
Traffic safety



- Less traffic – fewer accidents
- Higher travel speed – worse injuries (small effect)
- Time period too limited to observe accident rates
- Estimated reduction of personal injury accidents of 5 - 10 % within the congestion charging zone

Environment and health effects

- CO₂ - 14 percent
- NO_x - 7 percent
- PM₁₀ - 9 percent
- Emissions were reduced in the "right" area

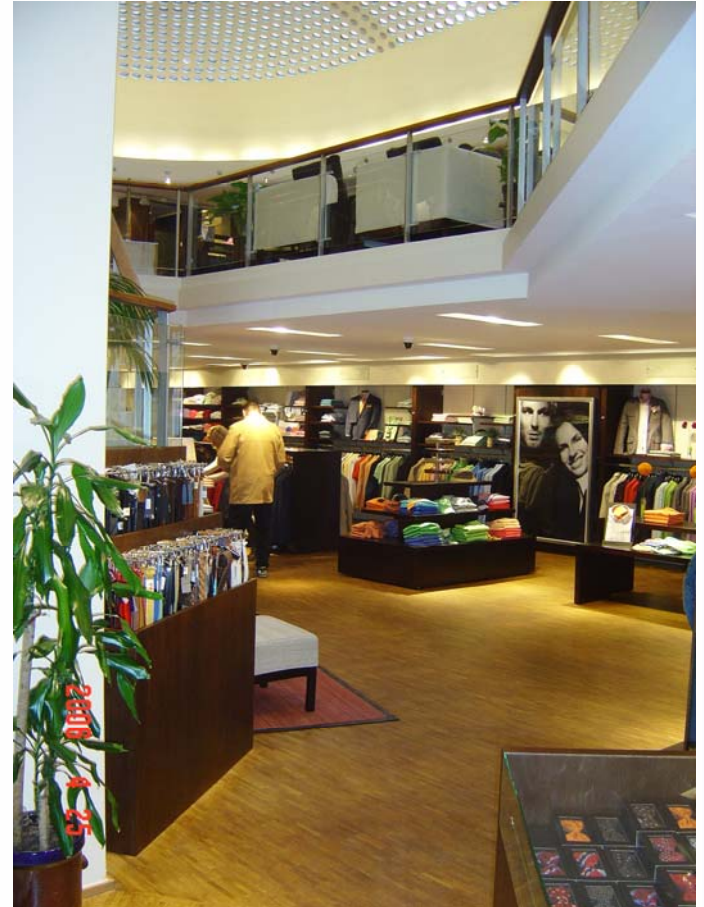


Noise – not much of an effect

- Approximately 1 dBA, and at most 2 dBA
- Effect not audible
- Share of disturbed people decreased

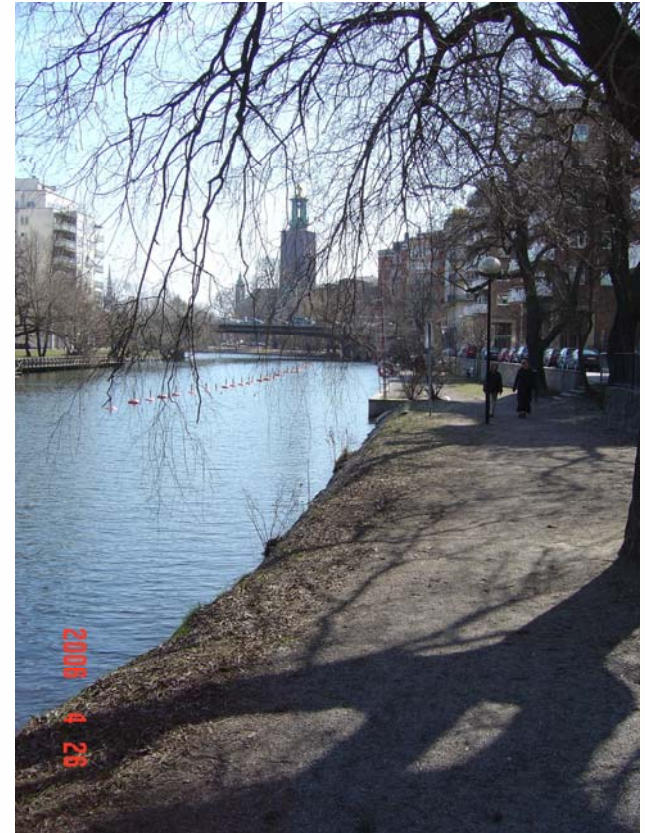
Retail

- Minor effects on the retail trade
- Department stores, malls and shopping centres trade increased 7 % in city (+ 7 % in nation)
- Small-scale shops sales -6 % (trend)

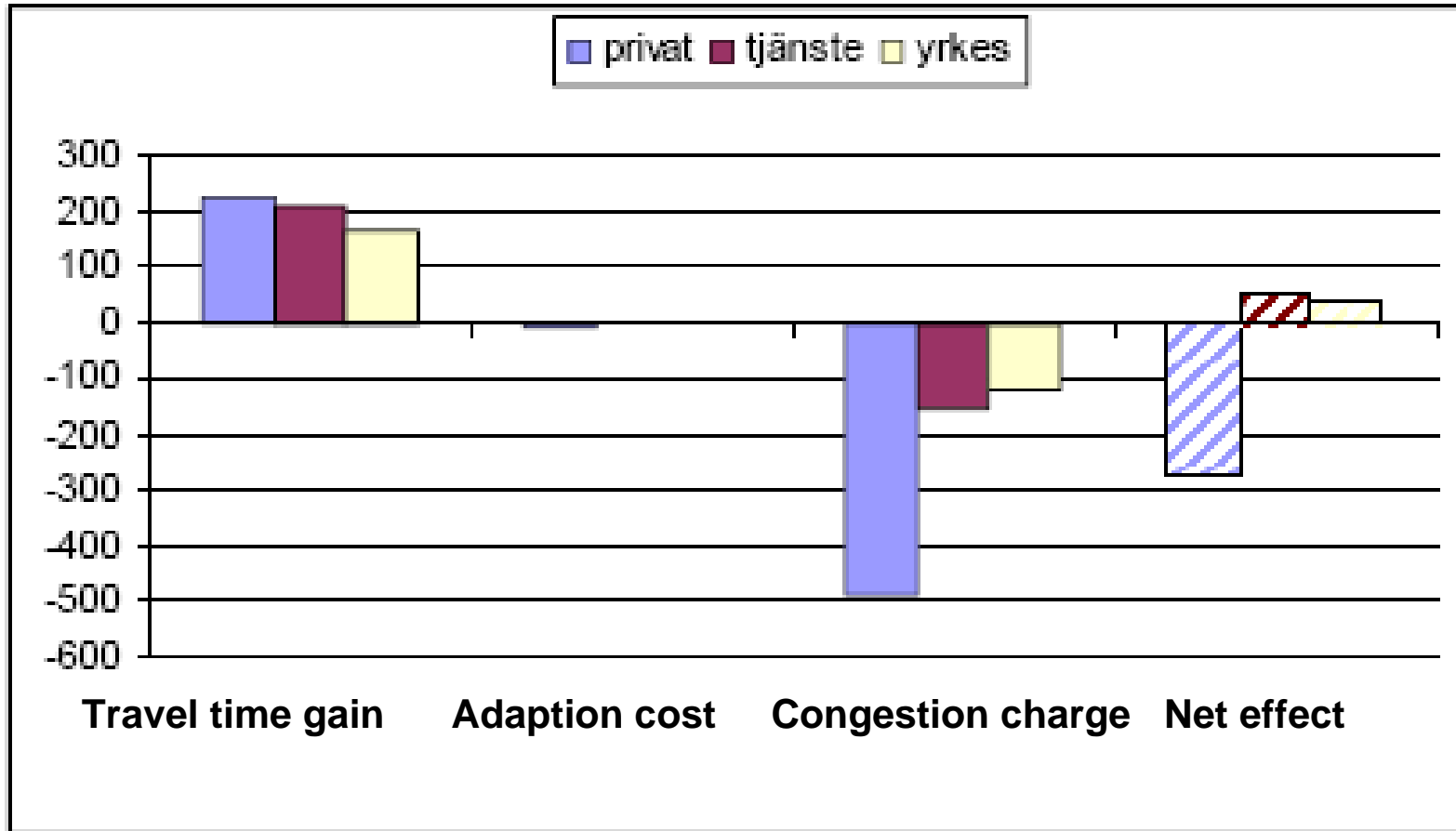


Cost benefit analysis

- Costs of the trial EUR 340 millions
- Congestion tax a permanent feature
 - Net gain EUR 77 millions/year – considerable values in social benefit
 - Payback time 4 years
- Expansion of bus traffic a permanent feature
 - Benefits EUR 18 millions/year
 - Operating costs EUR 52 millions/year



Costs and benefits by category



Urban environment

- Difficult to measure
 - Weather important factor
- Positive indicators
 - Car accessibility, air quality, traffic tempo
- Unchanged indicators
 - Safety, noise
- Negative indicators
 - Public transport, walk and bicycle accessibility, overall feeling

The objectives were fulfilled



- Reduce traffic volumes by 10-15% on the most congested roads
 - Reduction of 20-25%
- Increase the average speed
 - Travel times reduced 30-50%, except of E4/E20
- Reduce emissions of pollutants harmful to human health and of carbon dioxide
 - 14% reduction in city centre, 2.5% Stockholm County
- Improve the urban environment as perceived by Stockholm residents
 - Difficult to measure

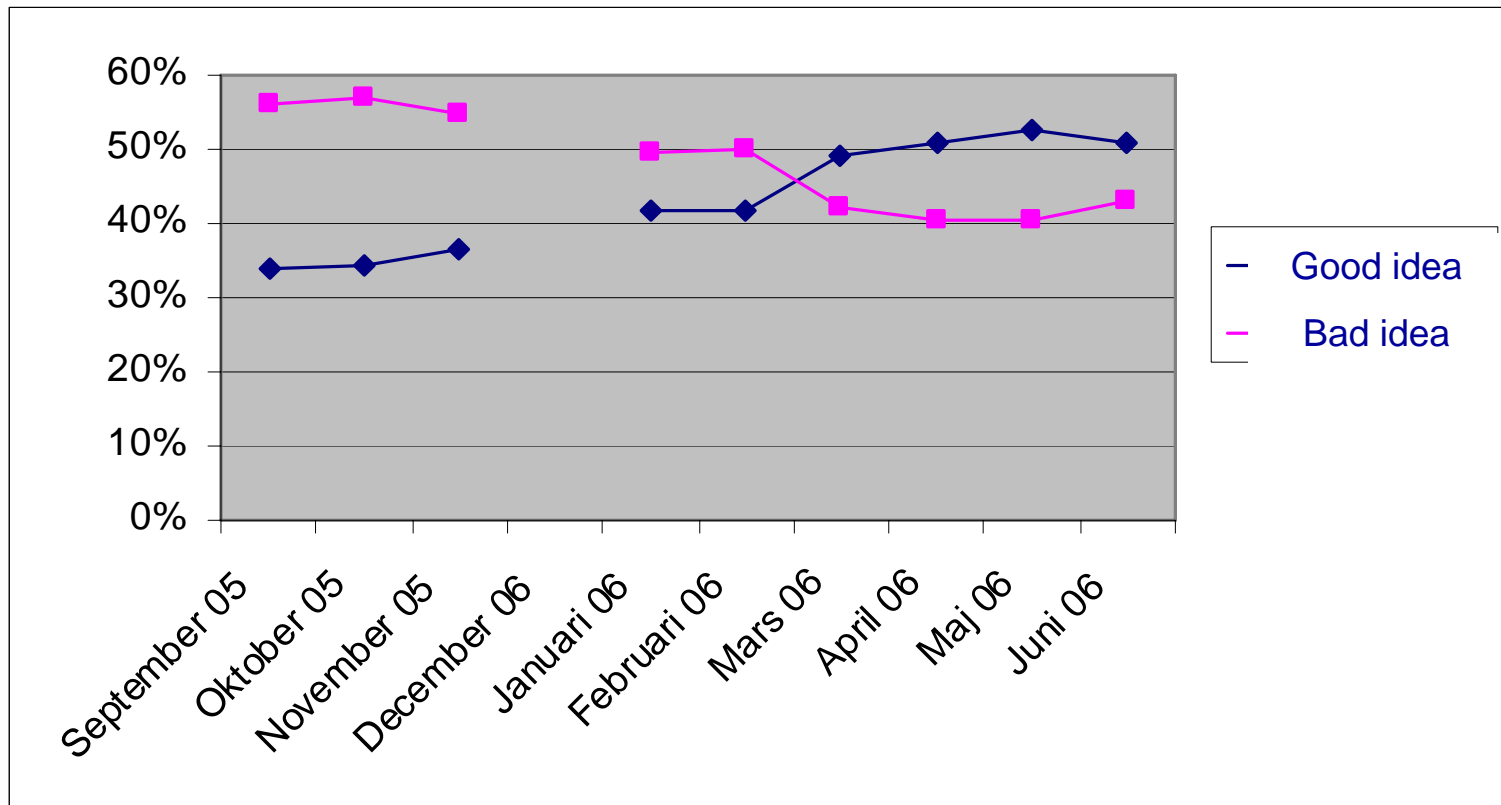
Large effects as compared to other measures

- Eastern bypass **1.5 bilj €**
 - 14% traffic reduction over the inner city cordon
- Western bypass: **2 bilj €**
 - 11% traffic reduction over the inner city cordon
- Free public transport **0.5 bilj €**
 - 3% less car traffic in the county

How was the trial received by the public?



Was it a good idea to carry out the congestion charge trial?



Results of the referendum 17 Sept 2006

	Yes	No
Stockholm City	53 %	47 %
County (14 Municipalities)	40 %	60 %
Not voting (11 Municipalities)		
Total voting	48 %	52 %

They agreed on...

Before elections 2006:

Referendum - Let the people decide!



Referendum - Let the people decide!

Stockholm local politicians

It is not always easy to be a politician...

Referendum - Let the people decide!

Before elections 2006:



Referendum - Let the people decide!

Stockholm local politicians

After elections 2006:



FOTO: YVONNE ÅSELL

Sweden national politicians

It is not always easy to be a politician...

After elections 2006:



Stockholm local politicians

After elections 2006:



Sweden national politicians

Congestion charging?

Let's make it permanent

It is not always easy to be a politician...

Before elections 2006:



You betrayed us!

Stockholm local politicians

After elections 2006:



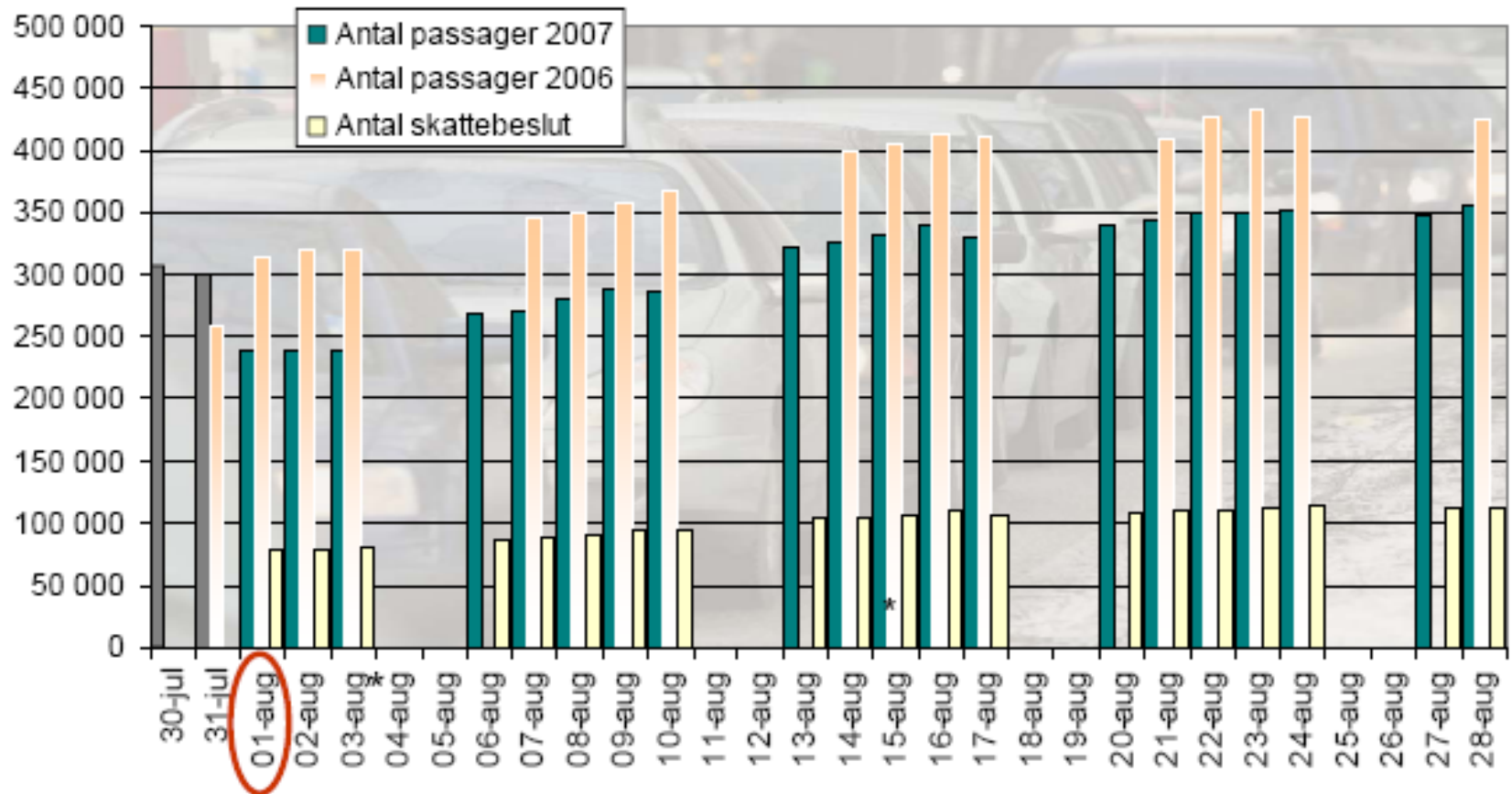
Congestion charging?
Let's make it permanent!

Sweden national politicians

Permanent system in operation

- No charge in July
- Taxi and transport for disabled not exempted
- Alternatively fuelled car exempted only for 5 years
- Administrative fee for delayed payment 200 SEK (previously 500 SEK)
- Congestion charge tax deductible for commuting and business
- No transponder needed for autogiro payment
- Easier administration for companies

First month (August) effects



Continued monitoring

- Traffic volumes, travel times monthly
- Total VMT, congestion, travel time variance October
- Effects on retail (600 stores, 12 shopping centres) 2008
- Effects on environment 2008
- Bottleneck analysis 2008
- Parking 2008
- Traffic safety 2008
- Cost benefit analysis 2008
- Regional economic analysis 2008

Conclusions on the Stockholm Congestion Charge Trial

- The charging scheme proved to be efficient
- The trial made it possible for everyone to see for himself
- The visible effects made people change their minds
- The change of minds made it possible to make the efficiency gains permanent

The end

More information (in English) :

www.stockholmsforsoket.se (trial)

www.vv.se (current system)

Benefits and costs

Tabell 13. Samhällsekonomiska nyttor och kostnader, miljoner kronor per år.

<i>(milj. kr per år)</i>	Trängsel- skatt	Utökad busstrafik	Totalt
Kortare restider	523	157	680
Säkrare restider	78	0	78
Förändrat resande	-13	24	11
Ökade reskostnader	-763	0	-763
Summa trafikanteffekter	-175	181	6
Mindre klimatgasutsläpp	64	0	64
Hälsoeffekter och övriga miljöeffekter	22	0	22
Ökad trafiksäkerhet	125	0	125
Summa övriga effekter	211	0	211
Trängselskatteintäkter	763	0	763
Kollektivtrafikintäkter ⁴¹	184	0	184
Intäkter från bränsleskatt	-53	0	-53
Slitage på infrastruktur	1	0	1
Bibehållen kollektivtrafikstandard ⁴²	-64	0	-64
Summa offentliga intäkter och kostnader exkl. drift- och investeringskostnader	831	0	831
Totalt samhällsekonomiskt överskott exkl. drift- och investeringskostnader⁴³	867	181	1048

Benefits and costs

Tabell 15. Nyttor och kostnader vid en permanentning av Stockholmsförsöket.

<i>(milj. kr per år)</i>	Trängsel- skatt	Utökad busstrafik	Totalt
Samhällsekonomiskt överskott (exkl. drift/investering – se Tabell 13)	867	181	1048
Driftskostnader	-220	-341	-561
Snedvridnings- och alternativkostnad	118	-181	-62
<i>Samhällsekonomiskt överskott per år vid en permanentning</i>	765	-341	424
Avskrivningskostnader för investeringar	-50	-3	-53
Snedvridnings- och alternativkostnad	-26	-2	-28
<i>Samhällsekonomiskt överskott inkl. avskrivningskostnader</i>	690	-346	344

Regional long term planning – forecasting 30 years ahead

- Congestion increases
- Public transport loses market share
- Difficult to reduce congestion by public transport improvement

