

Urban Tolling in Norway

Practical Experiences, Social and Environmental Impacts and Plans for Future Systems

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Road tolling in Norway

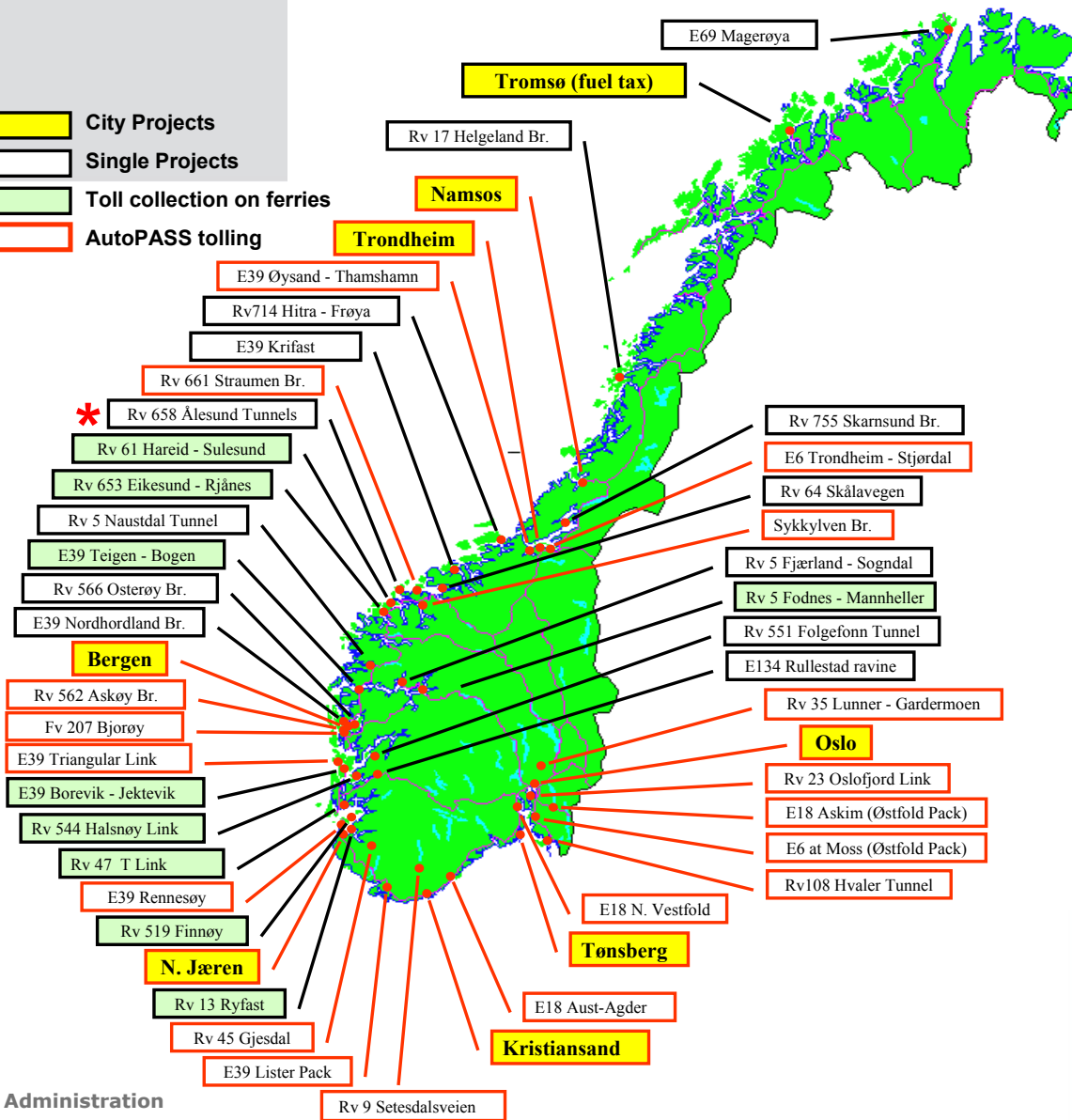
- **70 years** of road tolling experience to finance expensive infrastructure (mountains / fjords)
- **More than 100 road toll projects** implemented
- Toll collection normally **lasts for 15 years**
- **45** road toll projects in operation **today**
- **Urban** toll systems in the last 20 years
- **Point payment only** (open systems)
- Norway has been a **pioneering** country in developing **cost efficient** road tolling



Tolling Projects in Norway by 2005

- City Projects
- Single Projects
- Toll collection on ferries
- AutoPASS tolling

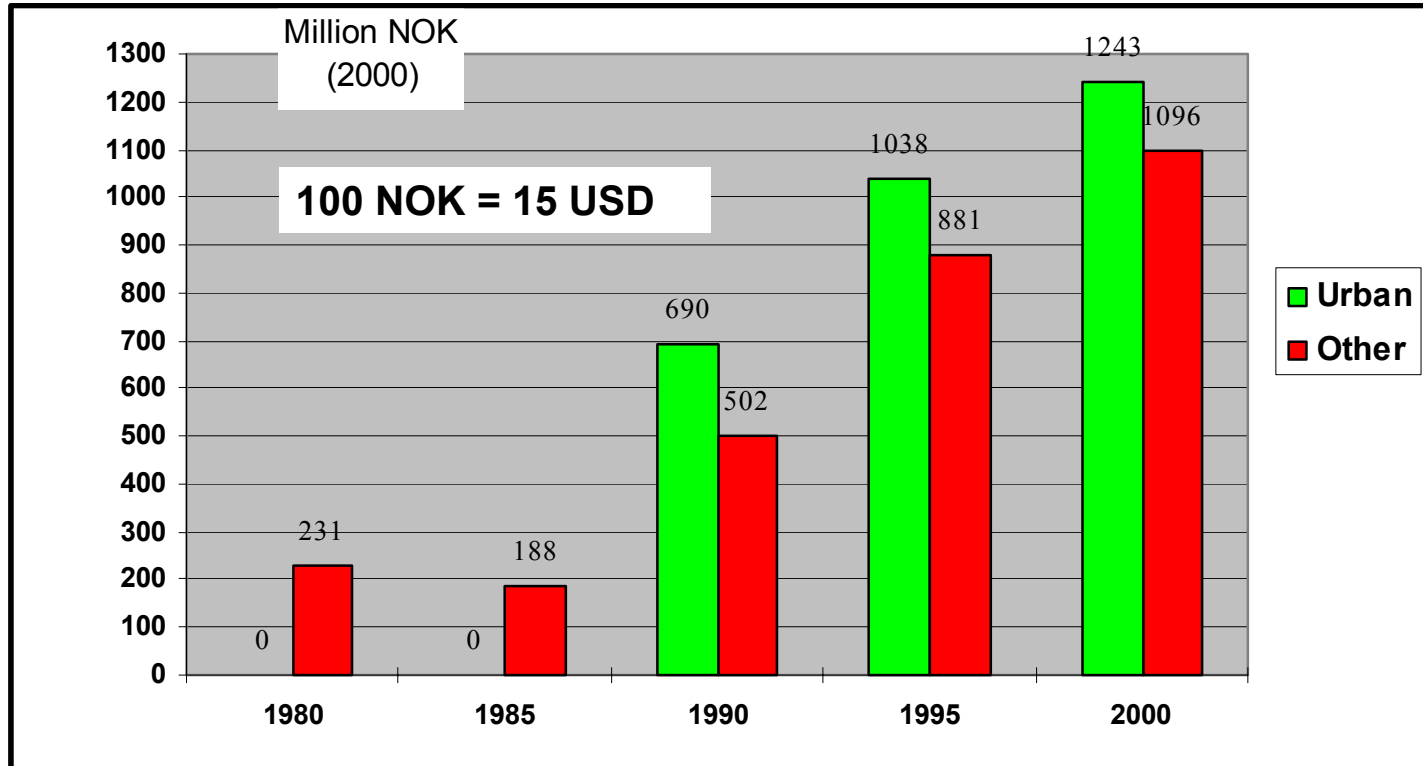
- **Bergen (1986)**, our first toll ring
- **Ålesund*** (1987), the first toll plaza with **EFC** in the world
- The toll rings in **Oslo** (1990) and **Trondheim** (1991) are other important pioneering projects



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Road toll revenues have been growing rapidly during the last 20 years



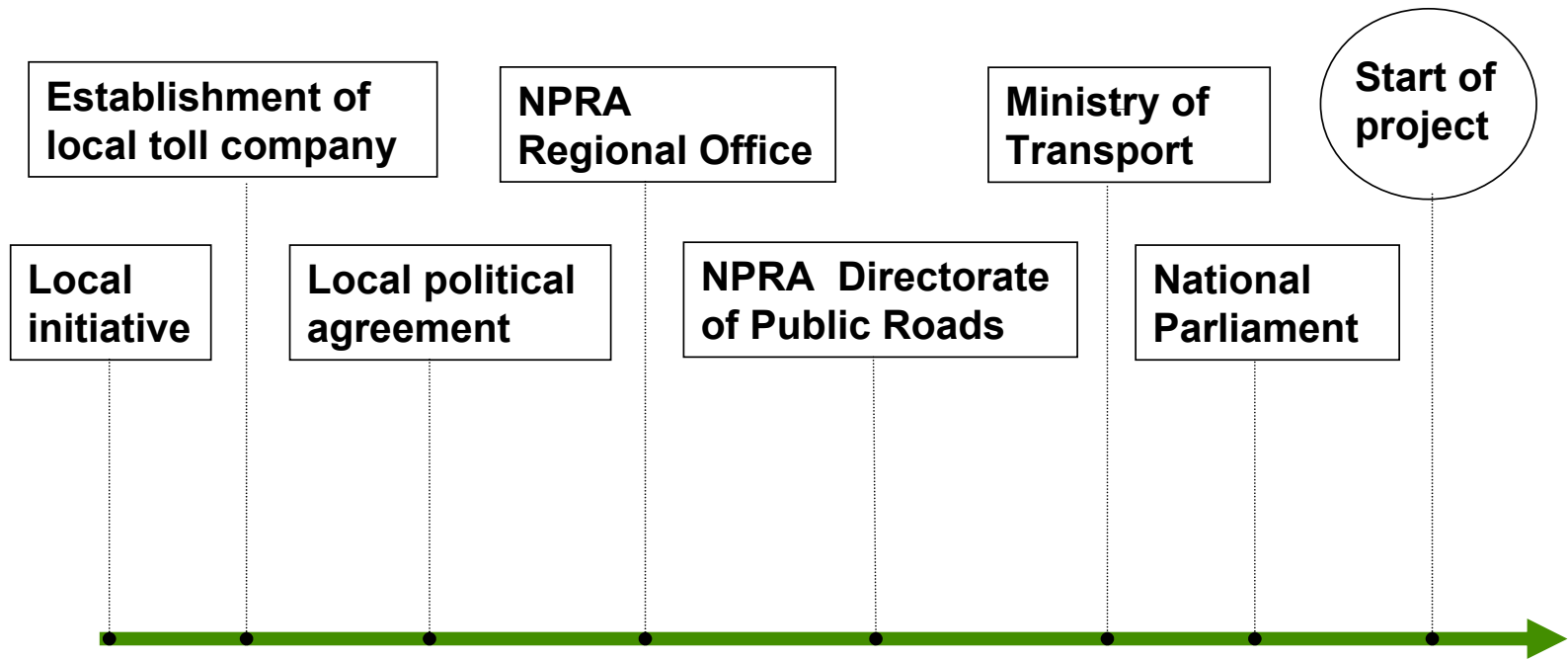
Toll revenues now contribute approx. one third of the investments in national roads



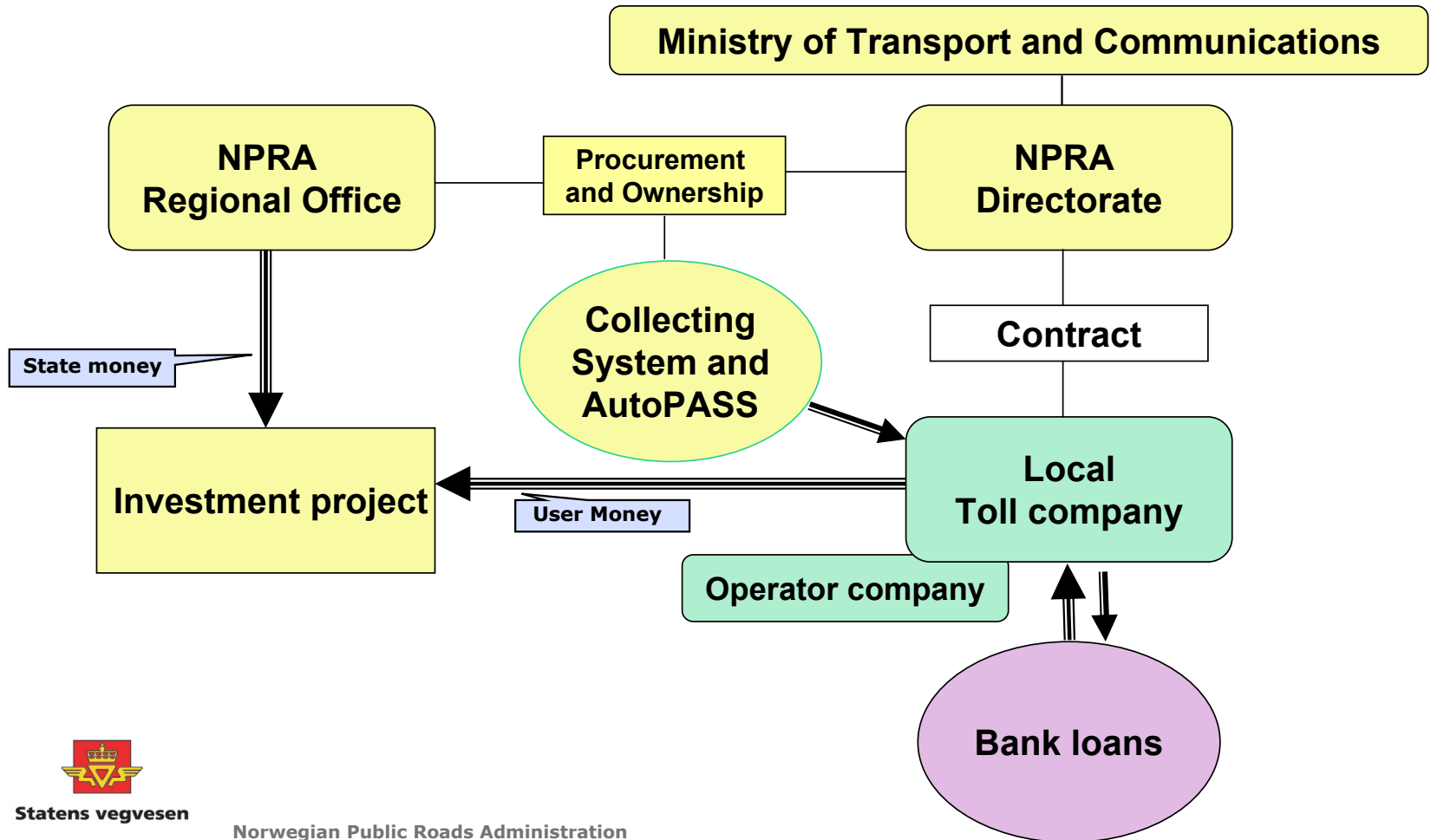
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Planning procedure for Norwegian road toll projects



Organisation of road tolling



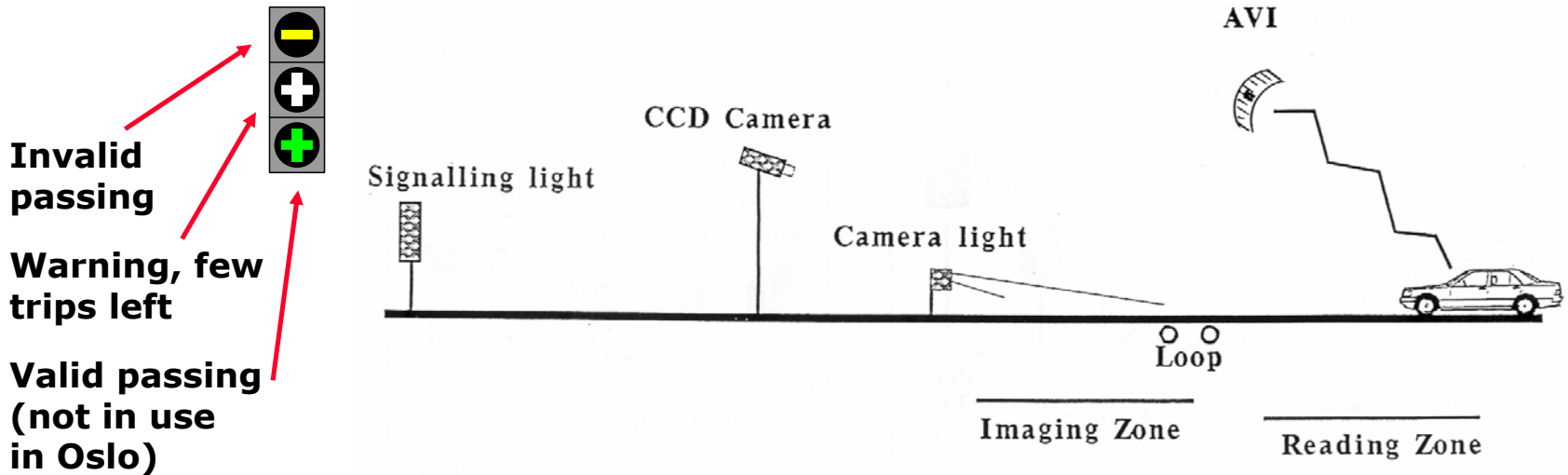
Ålesund (1987), the first toll plaza with EFC in the world (located between two 4 km subsea tunnels between the city of Ålesund and the airport)



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Layout of a Norwegian EFC lane



- The AVI and camera systems manage high speeds
- Due to traffic safety, the maximum speed limit is set to 60 km/hour



A manned Oslo toll plaza on a western arterial

- The subscription lane ("abonnement") has a high capacity, approx. 1600 veh/hour
- Approx. 300 veh/hour capacity in coin machine and attended ("manuell") lanes
- No expansion of total road area was necessary



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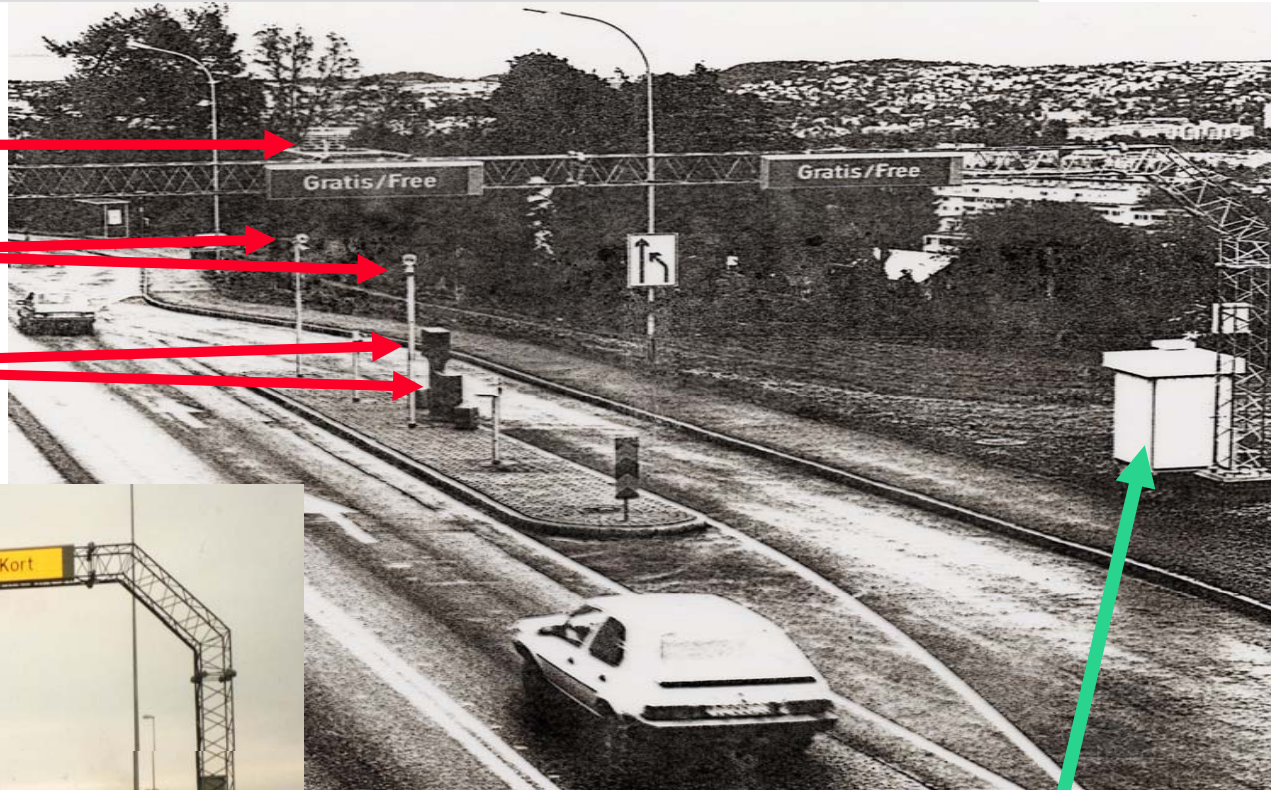
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Low cost unattended toll plazas were introduced in Trondheim in 1991

EFC antenna

Video cameras

Low capacity
coin machines



**Plaza computer
and electronics**



Low capacity "P-type" coin machines in unattended self service toll plazas

The lower unit is for light vehicles

The upper unit is for heavy vehicles



The "P-type" coin machines have:

- Slot for inserting coins
- Printer for receipts
- Button to activate intercom for assistance

The last step is implementing “Fully automatic free flow toll plazas” – will it be the new hit?

- **No stop at the toll plazas**
- **Drivers without AutoPASS (EFC) will be videoed and billed monthly for the exact fee**
- **In Bergen and Tønsberg since February 2004**
- **Picture shows the major toll station in Tønsberg**



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Laser
detection
and DSRC



Rear
camera



Front
camera

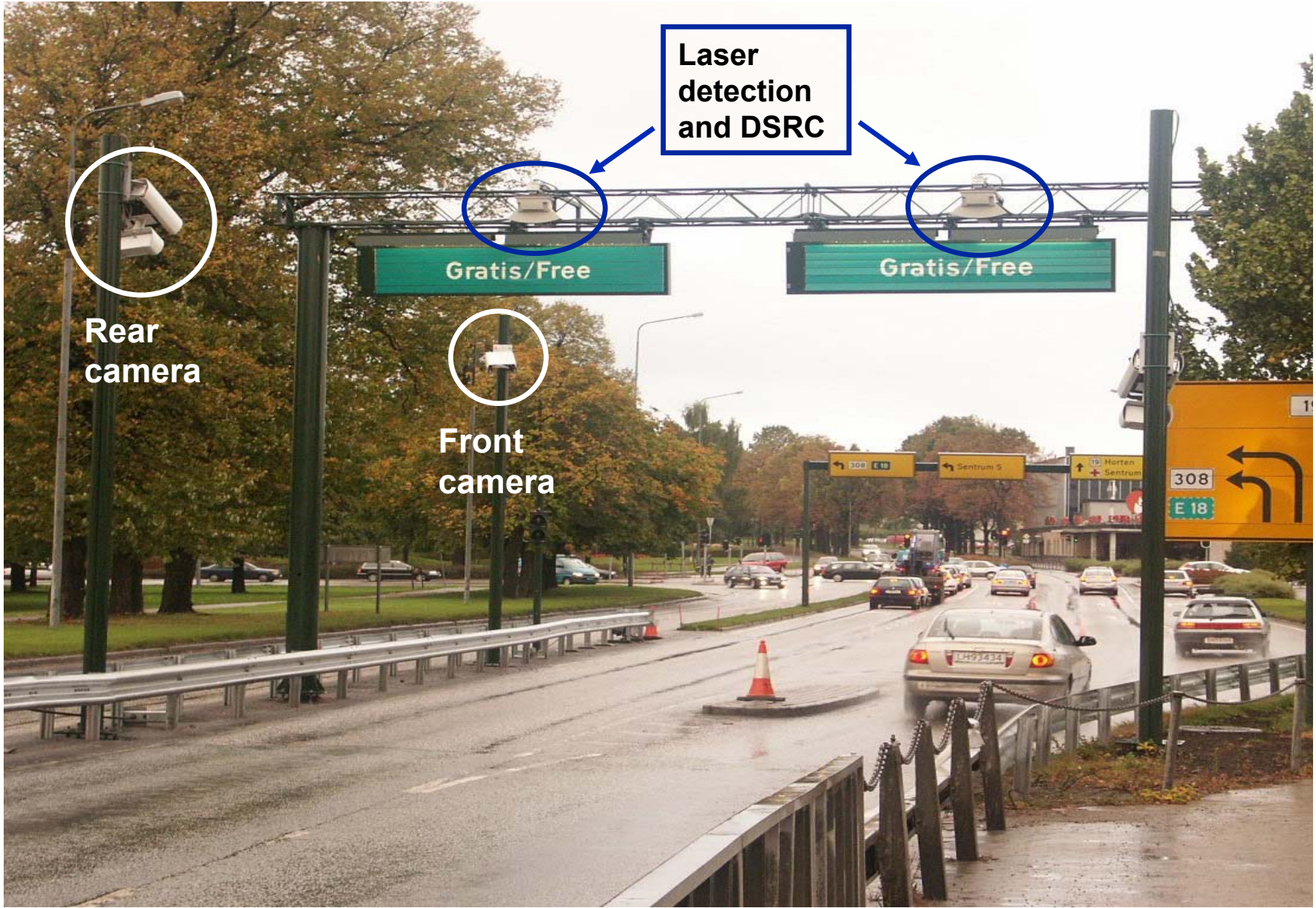
Gratis/Free

Gratis/Free

308 E 18

Sentrum 5

19 Harten
+ Sentrum



Urban toll rings in Norway – May 2004

City	Pla- zas	Start	End	Pop. in ar.	In op.*	AADT **	EFC %	Tags	NOK /Pbe
Bergen 1	8	1986	2004	300'	16/5	60'	-	-	5-10
Oslo	19	1990	2007	900'	24/7	250'	81	400'	10-20
Trondheim	12 17 23	1991 1998 2003	2005	250'	11/5 12/5	100'	94	150'	10 15
Kristian- sand	5	1997	2007	100'	24/7	55'	83	30'	10
N. Jæren (Stavanger)	21	2001	2011	230'	12/5	150'	90	110'	<u>5/10</u>
Namsos	3	2003	2017	15'	12/5	7'	87	10'	13
Tønsberg	6	2004	2019	50'	24/7	50'	84	35'	15
Bergen 2	8	2004	2014	300'	24/6	100'	85	105'	15



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* Hours a day and days a week
** During hours of operation

The "Oslo Package 1"

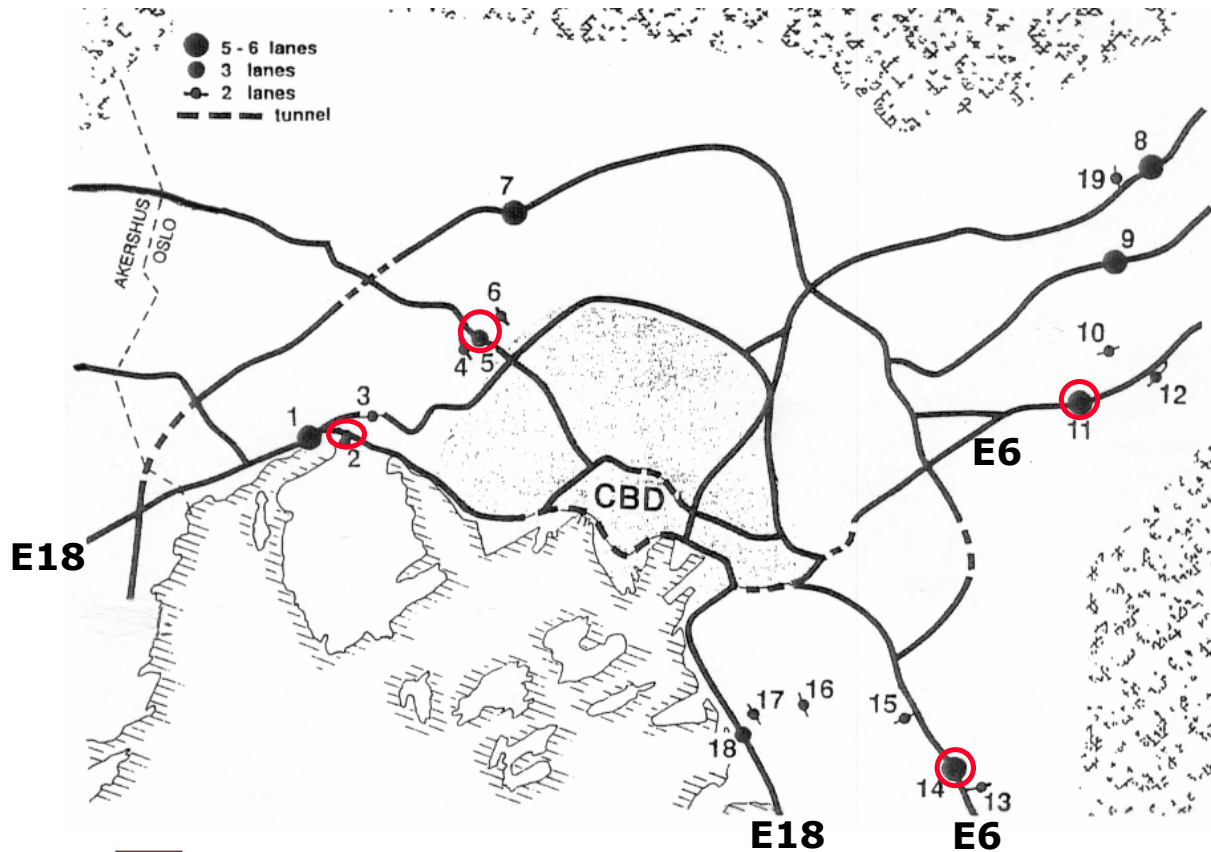
- Motivation: To build 50 pre-defined projects in ten years instead of 35 with state funds only
- Joint venture between Oslo (60%) and the neighbour county of Akershus (40%)
- Users contribute with 55% of funding
- The toll ring (white lines) covers all roads in three corridors
- 50% of Oslos population live outside the toll ring



- AADT in the payment direction is approx. 250 000
- Approx. 1 bill. NOK per year income, approx. 10% operation cost



Oslo Toll Ring layout



For economical and political reasons the best place for a toll ring was about halfway between the city border and the city centre.

Only four minor roads had to be closed in order to make the ring "watertight"



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Toll plaza no.2 on an E18 on-ramp

11 out of 19 toll plazas are minor with one lane for subscription and one attended lane only



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Toll plaza no.11 on E6 north is the largest in Oslo. It has 3+1 AutoPASS lanes



Toll plaza no.14 on E6 south



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**You will arrive here when approaching Oslo
from Stockholm or Copenhagen**

Toll fees in the Oslo Toll Ring

- Heavy vehicles have an allowed total weight higher than 3500 kg
- Pre-paid trip subscribers get up to 43% discount
- Monthly, semi-annual or annual subscriptions of unlimited use give even higher discounts
- Public transport, MC, EL-cars, ambulances, and handicapped persons do not pay



Oslo Toll Ring Experiences

- Overall reduction in traffic: 3-5%
- Growth in public transport: 6-9%
- Situation back to “normal” after only a few months
- Off peak drivers most sensitive to pricing
- No capacity problems in the plazas
- Higher workload and more comprehensive computer systems in the back office system than expected
- Users do not always behave as expected

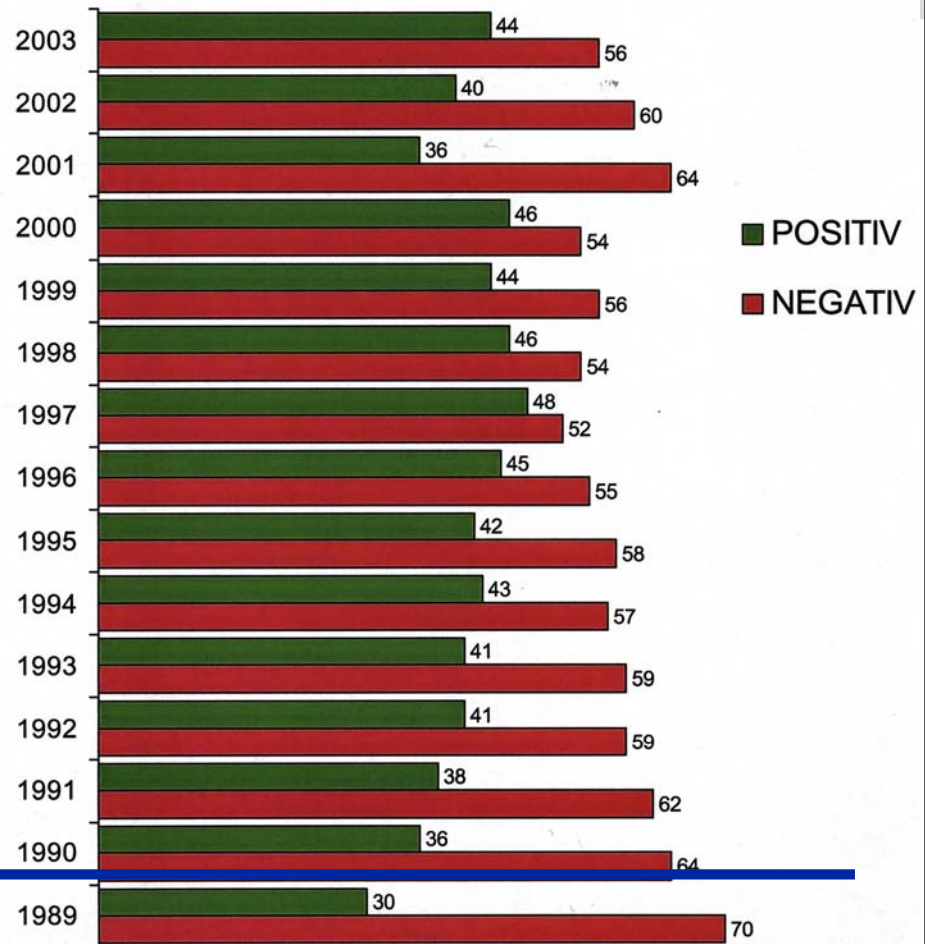


Opinion polls unveil a negative attitude to the toll ring in Oslo

The increase in negative attitude in 2001 is due to:

1. introduction of "Oslo Package no.2": NOK 2,- extra per passing allocated for public transport only
2. a fear that the toll ring will not be removed in 2007 which was the original decision

The toll ring opened 1. Febr. 1990



How was it possible to implement a toll scheme in Oslo that 70% were against?

- **Bergen initiated a successful toll ring in 1986**
- **Road traffic conditions were choking**
- **The major political parties agreed**
- **The toll is to finance road infrastructure**
- **Limited collection period, only 15 years**
- **Additional extra funding from the State is part of the plan**
- **Low fees**
- **Those opposed to car driving appreciate that the motorists have to pay**
- **20% of toll income is earmarked public transport**
- **User friendly fee structure (?)**
(multi-trip subscriptions with discount and season tickets)



What do we get?

The major projects in the Oslo Package 1 are several urban road tunnels

The most important of those is Festningstunnelen (The Castle Tunnel) below City Hall Square: 6 lanes, 1,6 km long, cost 2 bill.NOK

It was important for the acceptance of the toll scheme that the Castle Tunnel opened 2 weeks before the toll collection started. →

The City Hall Square is here → X



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The City Hall Street before opening The Castle Tunnel



The City Hall Street after opening The Castle Tunnel



The City Hall Square **after** opening The Castle Tunnel

- **The AADT was reduced from 90 000 to 0 vehicles**
- **New tram line opened**
- **A new plaza for walking, festivals and exhibitions**



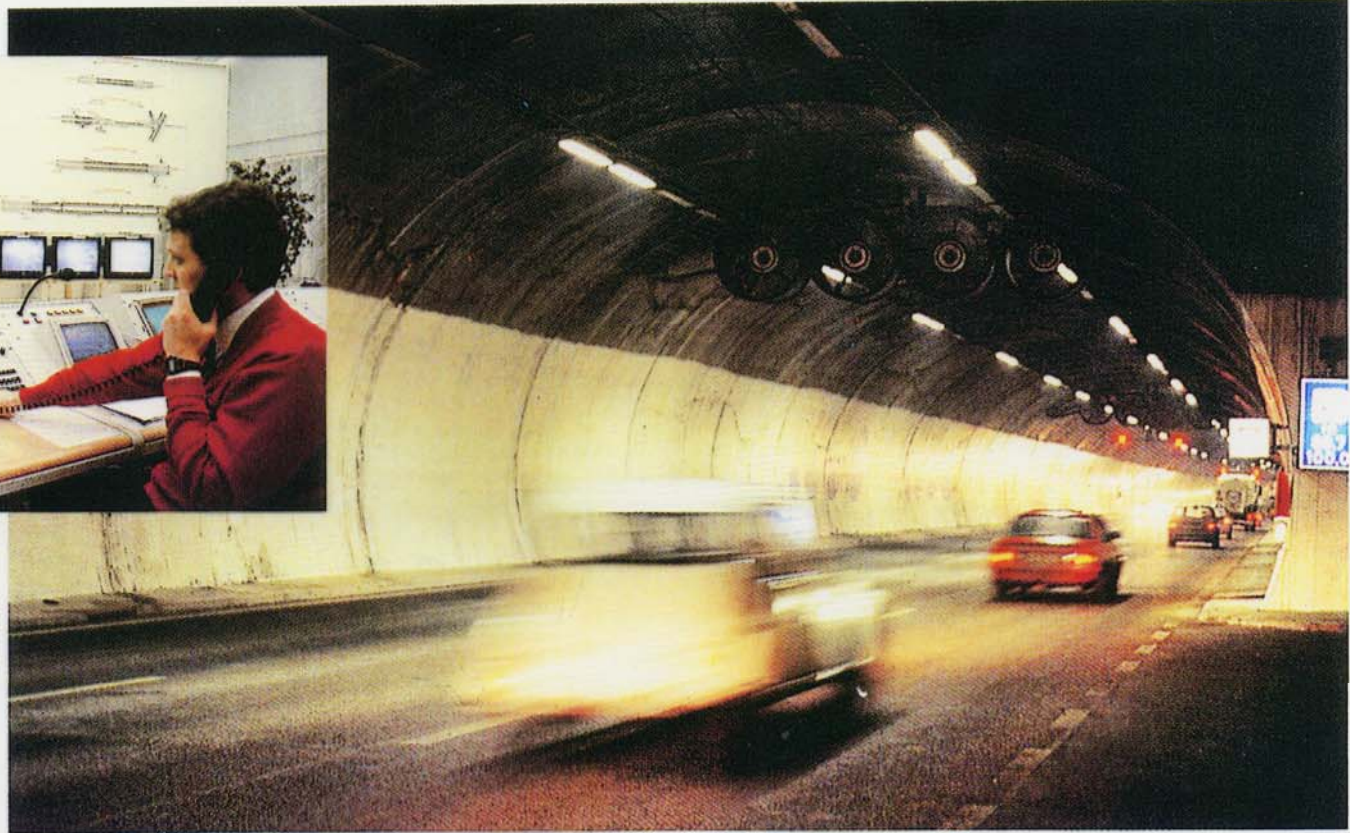
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The traffic goes here (down to -45 m)



This traffic control centre for Oslo employs advanced systems for managing vehicle movement in the Oslo Tunnel and large parts of the main highway system around the capital.



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Community importance of urban tunnels

- Reduced delay due to removal of bottlenecks
- Road space above ground can be made available for other uses
- Removed barrier effects from the surface street network
- Reduced above ground traffic noise
- Less pollution (high chimneys, filtering)
- Improved traffic safety



What does the future hold?

The Oslo Toll Ring expires in 2007 – will it:

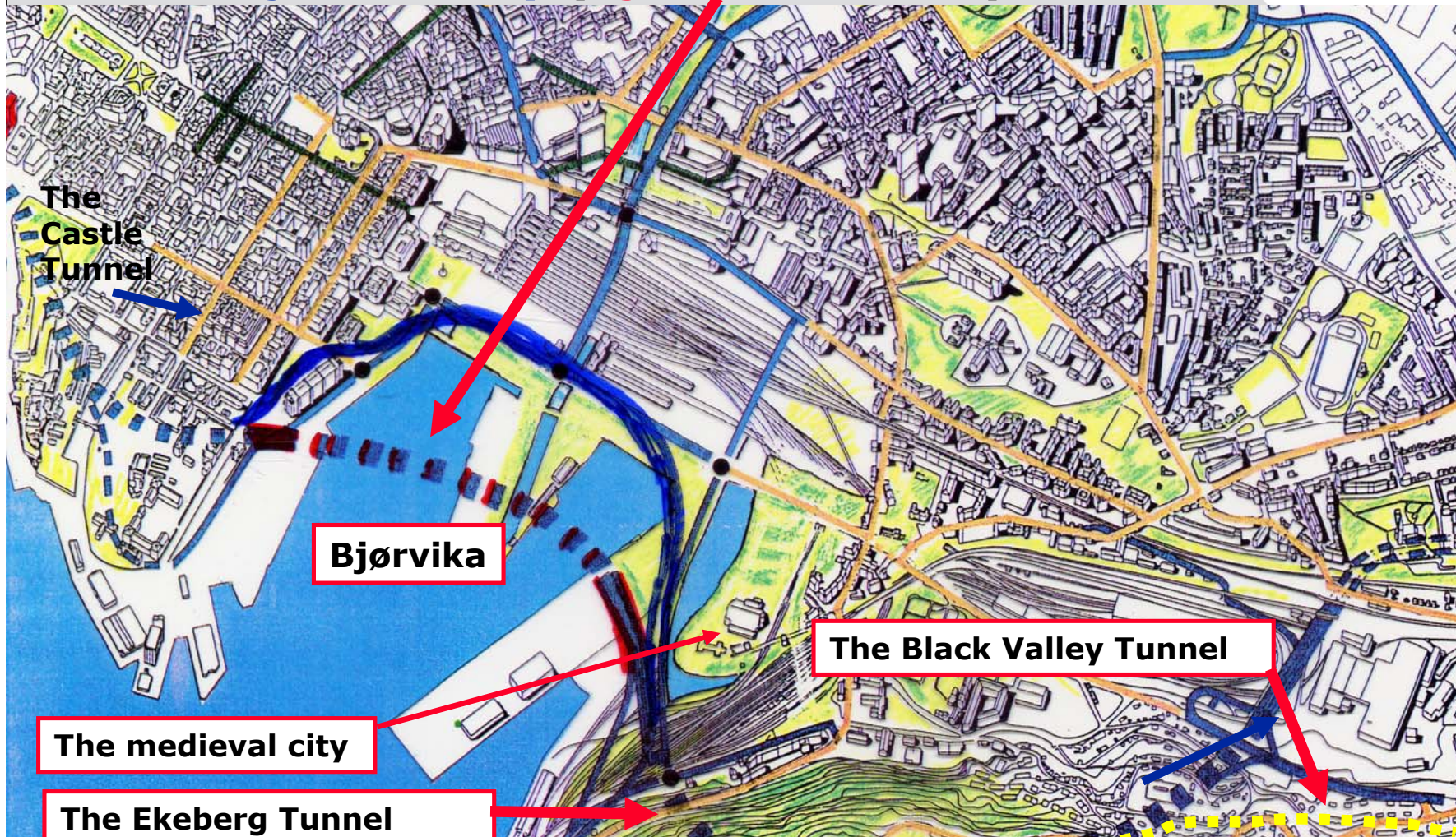
- 1. be removed?**
- 2. be extended (like the toll ring in Bergen)?**
- 3. get a time differentiated fee system to manage traffic during peak hours (congestion charging)?**
- 4. be replaced by an other type of congestion charging scheme?**

) : A project group is working on "Oslo Package 3".

So, time will show.



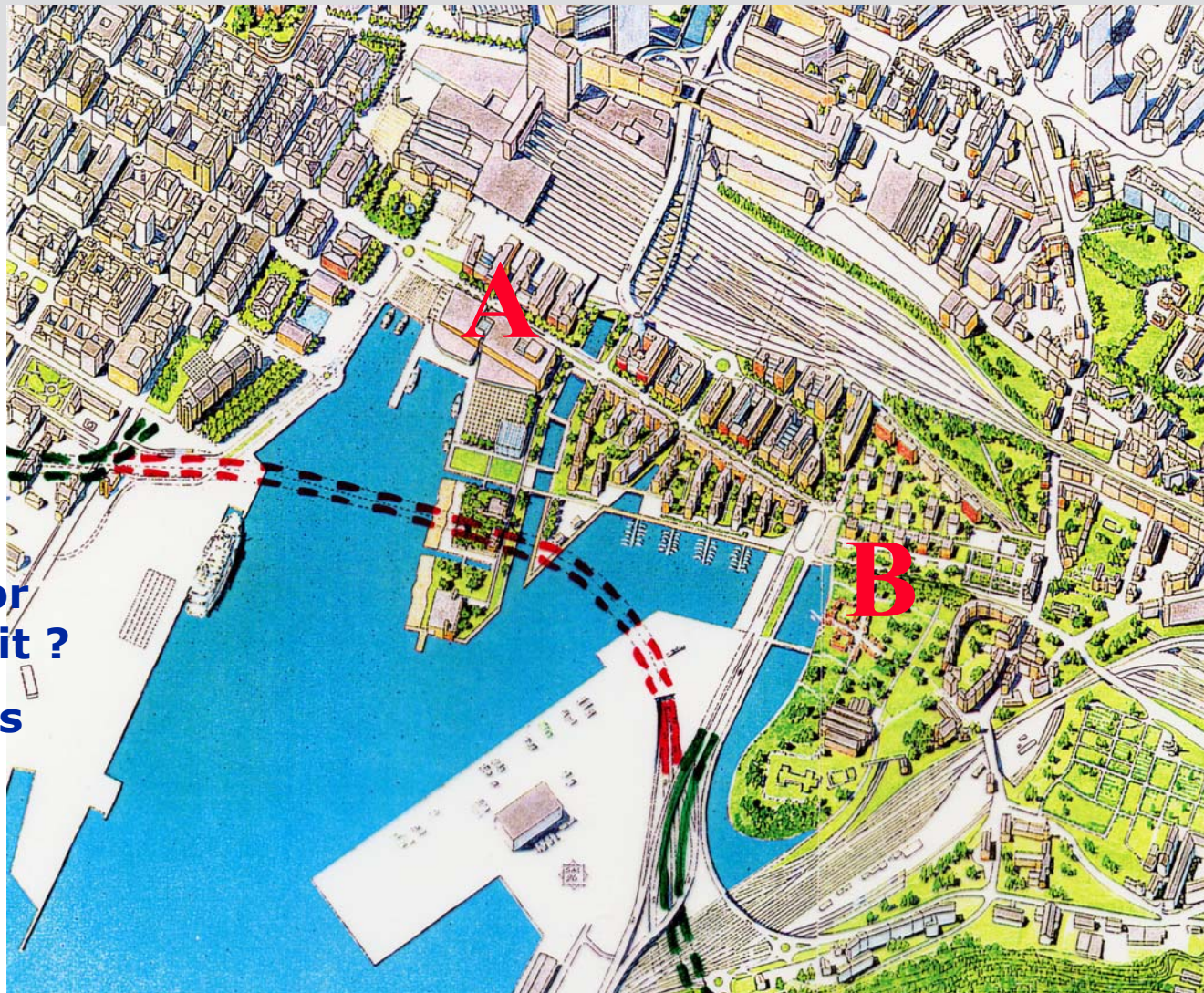
User financing will be needed for a very expensive extension of the Castle Tunnel across Bjørvika bay (**Bjørvika Tunnel**)



The new Bjørvika Tunnel will make room for a new district of Oslo between the new opera house (A) (under construction) and the medieval part of Oslo (B).

Shall the State or the City pay for it ?

) : The road users are once more the solution



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Future solution in Oslo

- An amendment to the Road Traffic Act giving the [formal base for congestion charging](#) has been passed in Parliament
- [Politicians](#), both on national and municipal level [want to keep their promise](#) to remove the existing toll ring in 2007
- [The city council is in favour of user payment also after 2007](#) to finance road and public transport infrastructure
- One of the solutions under discussion is a toll collection cordon with [time differentiation](#) of fees
- Other, possible solutions are also under consideration

So, will we see a new system being opened 1. January 2008 ??



“Congestion Charging light” favouring public transport

Fees (pbe):

NOK 3,- (1 unit)
in both directions

NOK 6,- (2 units)
in both directions

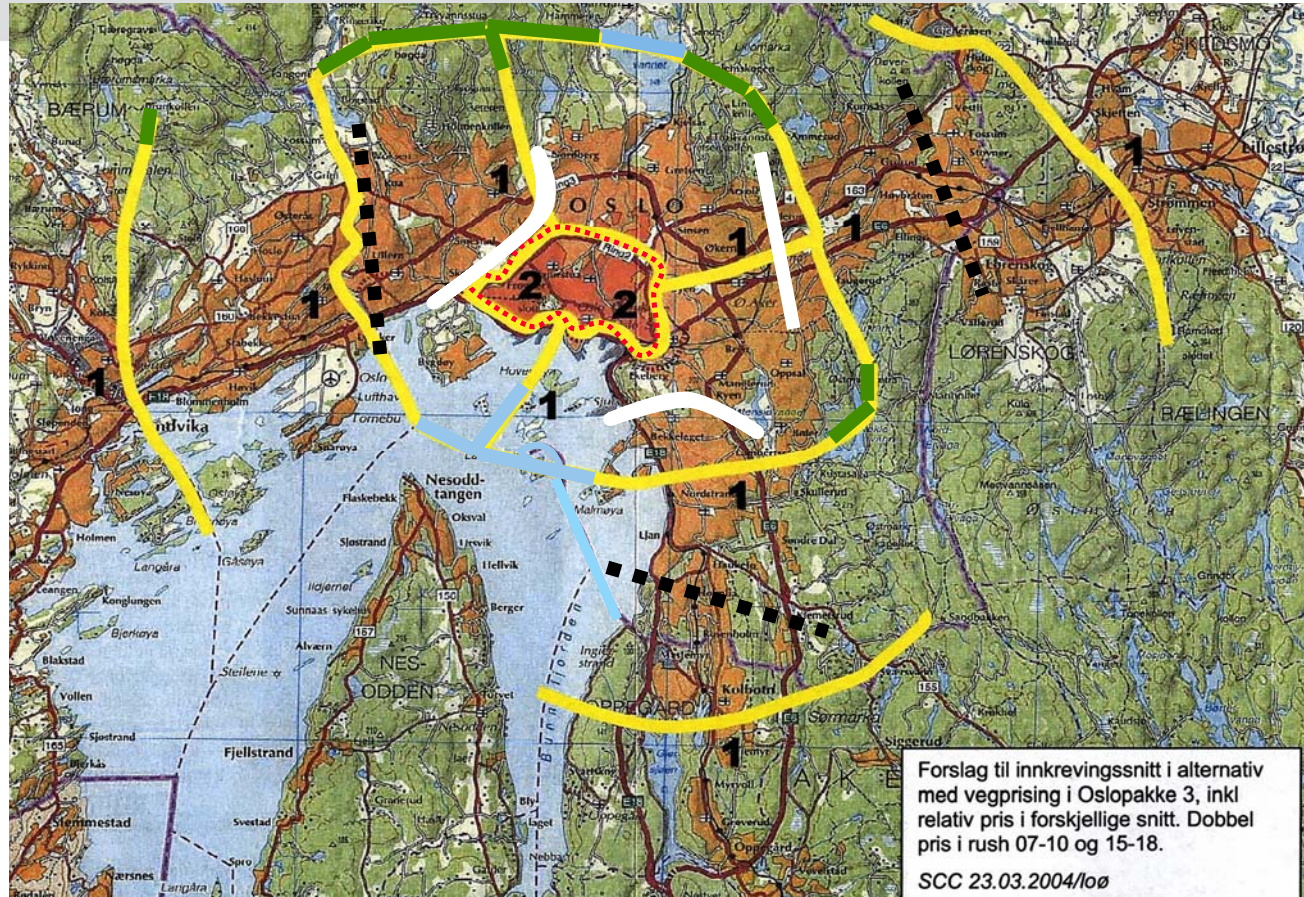
+ Double fees in
peak periods

+ Free periods
late evening and
night

+ Double fees for
heavy vehicles.

■■■■ City borders

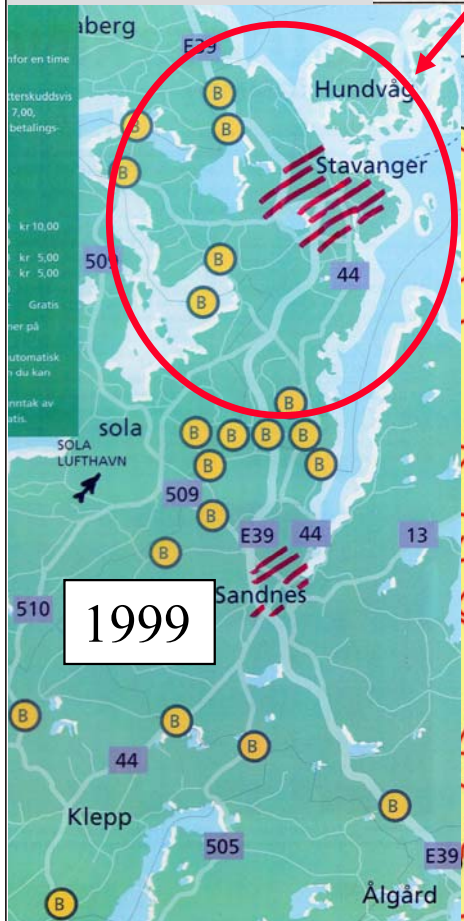
▭ The toll ring



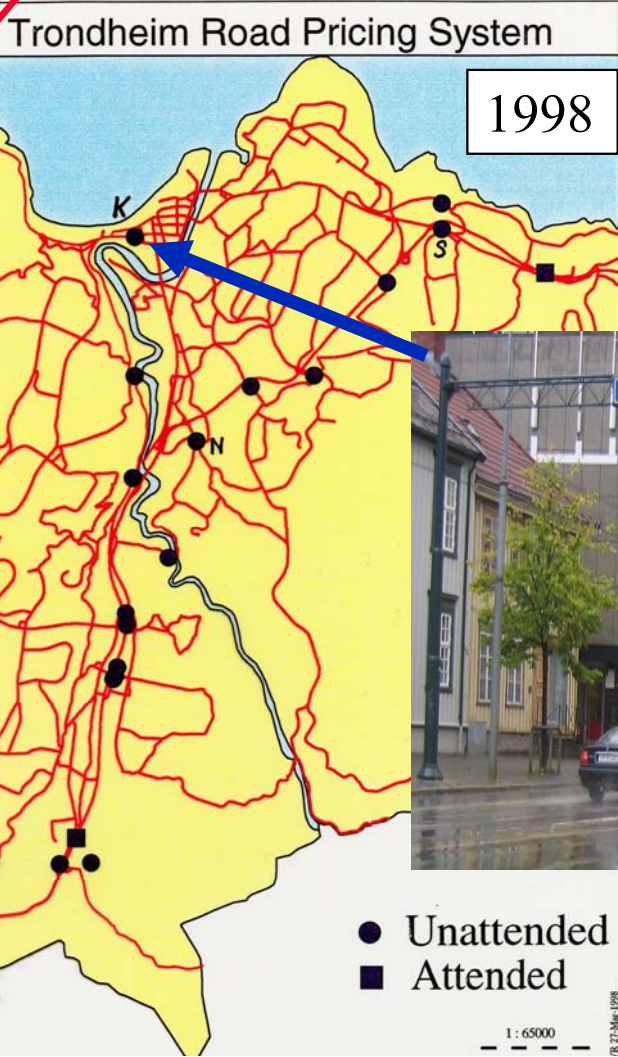
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Nord-Jæren (Stavanger) and Trondheim have zonal systems with unattended toll plazas



1999



1998

Unattended toll plaza in the centre of Trondheim (K)



Coin machines

- Unattended
- Attended

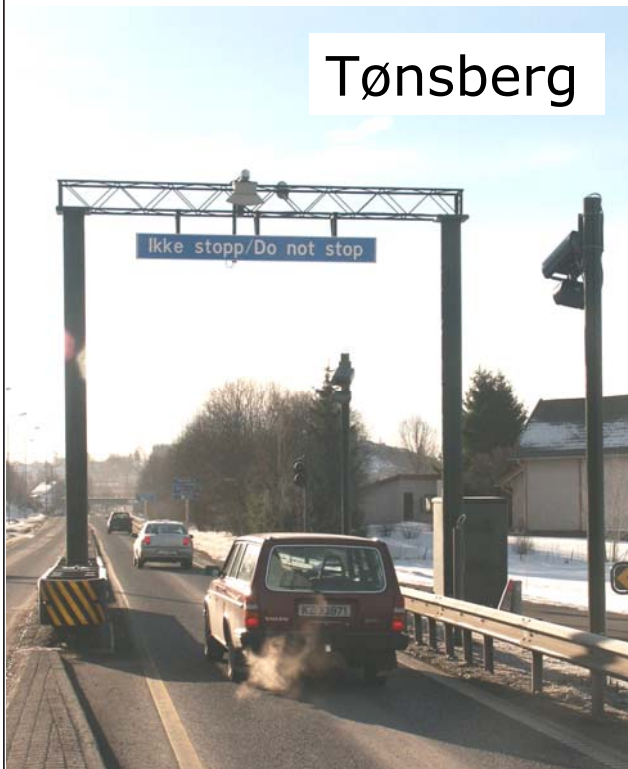
1 : 65000

FR 27-Mars 1998



A bidirectional multicordon road pricing system in Oslo will demand “fully automatic free flow” toll plazas similar to those in Tønsberg and Bergen

Tønsberg



Bergen

Free flow toll plaza challenges

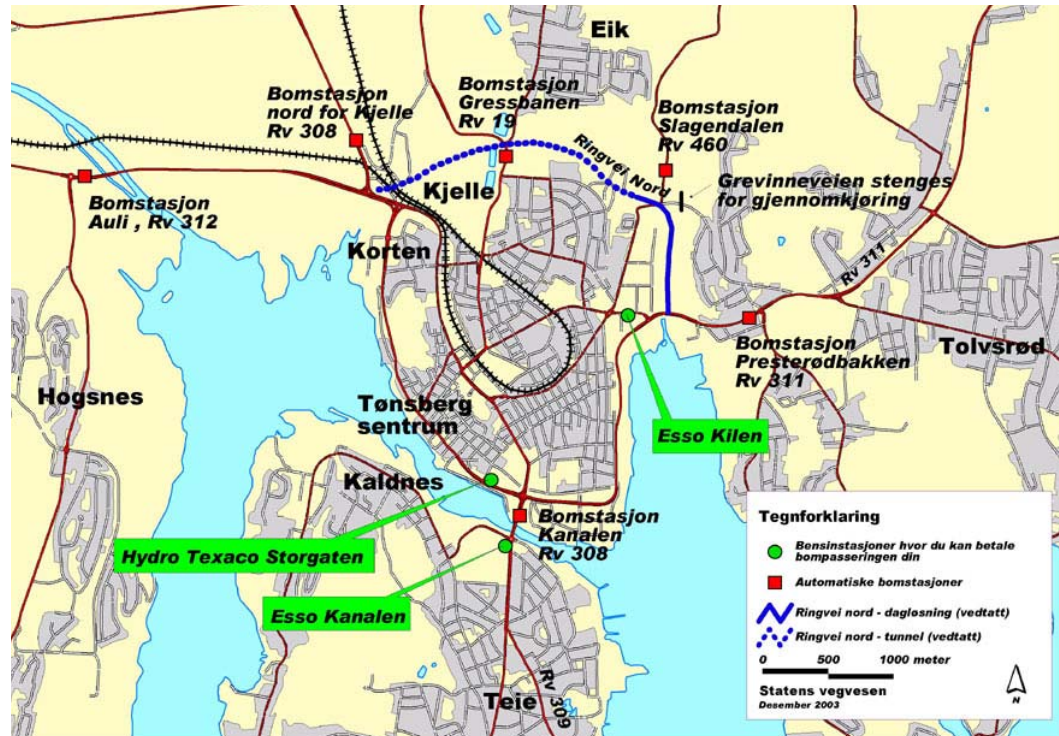
- Drivers have a right to be offered to pay cash in accordance with the Norwegian Act of finance
- How to inform uninformed drivers
- Privacy



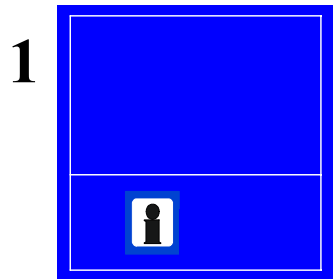
Trips may be paid with cash at certain petrol stations within two days



Anonymus tags are offered



Informational traffic signs in free flow toll plazas

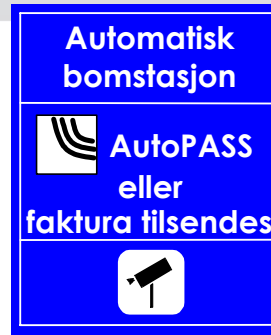


1 Extra pre-warning about free flow plazas

2 Information lay-by*



3 Pre-warning about toll



4 Main warning about free flow plazas



5 Information in English

6 Information lay-by*



7 Information about fees (close to gantry)



8 Information on the gantry



9 About the call center (after the gantry)



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* With a large information board

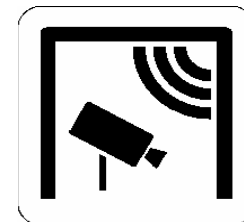
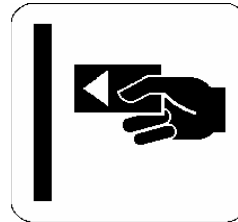
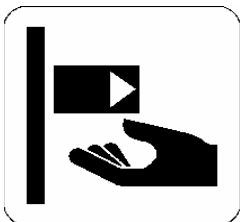
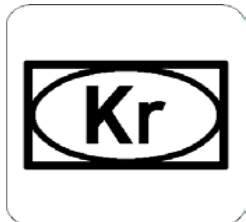
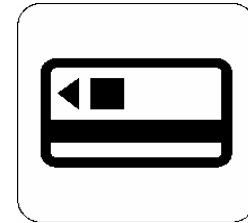
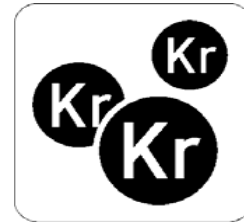
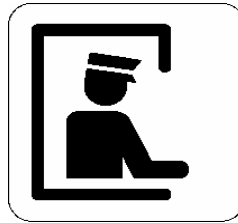
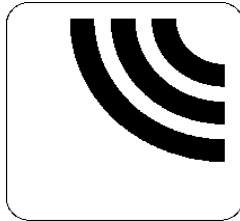
Fully automatic toll plazas in Bergen



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New traffic signs and symbols



AutoPASS



- A technical specification for EFC owned by NPRA
- Independent of industry and open to all from 1999
- In full compliance with CEN and ETSI standards for DSRC
- Designed for interoperability



History of EFC in Norway – a summary

1987 The worlds first EFC plaza in operation at Ålesund

1990 The first EFC City Toll Ring in Oslo

1991 The first unmanned Toll Ring in Trondheim

1997 The AutoPASS project was launched

2000 The AutoPASS implementation started

2004-02-01 Full National Interoperability for EFC

2004-02-02 Introduction of fully automated, free flow toll plazas



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The AutoPASS lanes lies to the right
in a manned freeway toll plaza



NorITS (Nordic Interoperability for Tolling Systems)



NorITS - The Great Belt Link



BroBizz

- **Opened in 1998.**
- **25 000 crossings per day.**
- **One toll plaza with 22 lanes (6 EFC lanes) and a revenue of 330 M€ per year !**
- **160 000 OBUs issued**



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NorITS - The Ôresund Bridge



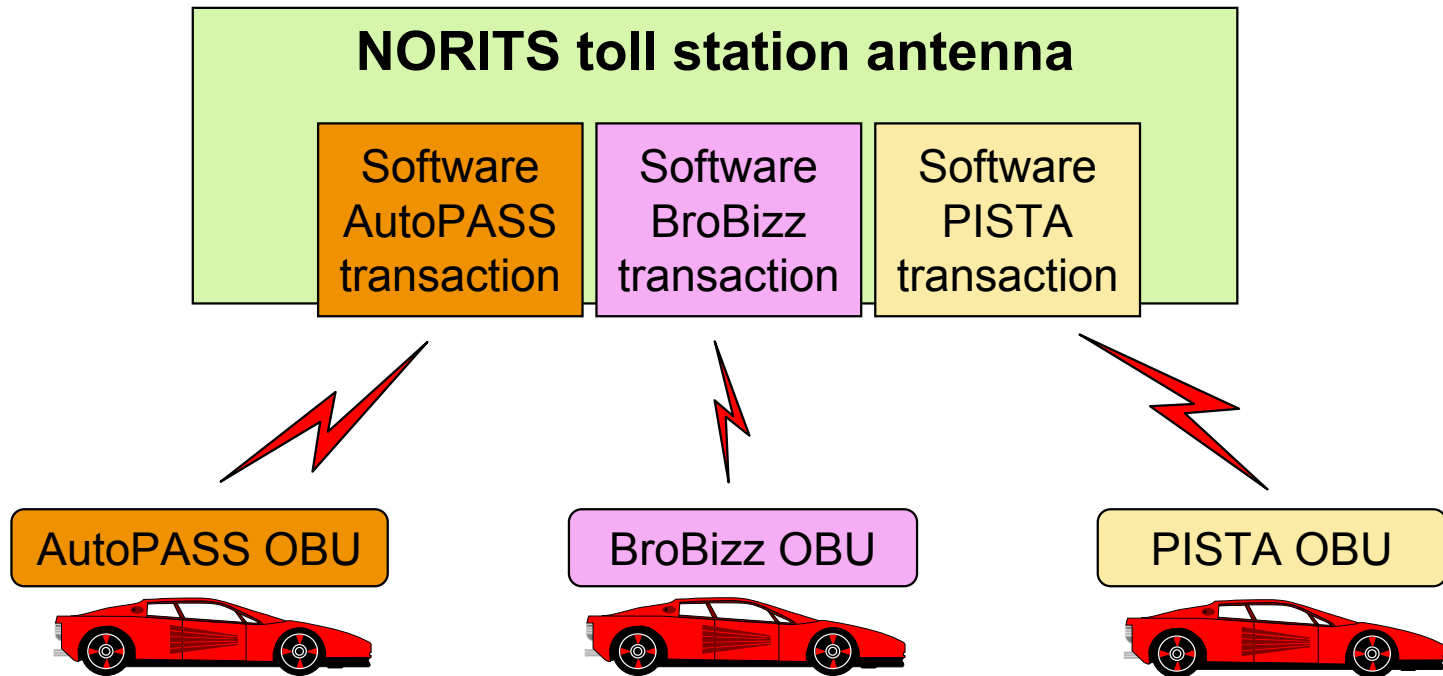
- **Opened in 2000**
- **Traffic in excess of 10 000 veh/day**
- **One toll plaza with 22 lanes (8 EFC lanes).**
- **100 000 OBUs issued**



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The NorITS Toll Station Solution



Thank you for your attention!

For more information:

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