Lessons from Scandinavia

Fact finding visit to Denmark and Sweden

May 21-28, 2008

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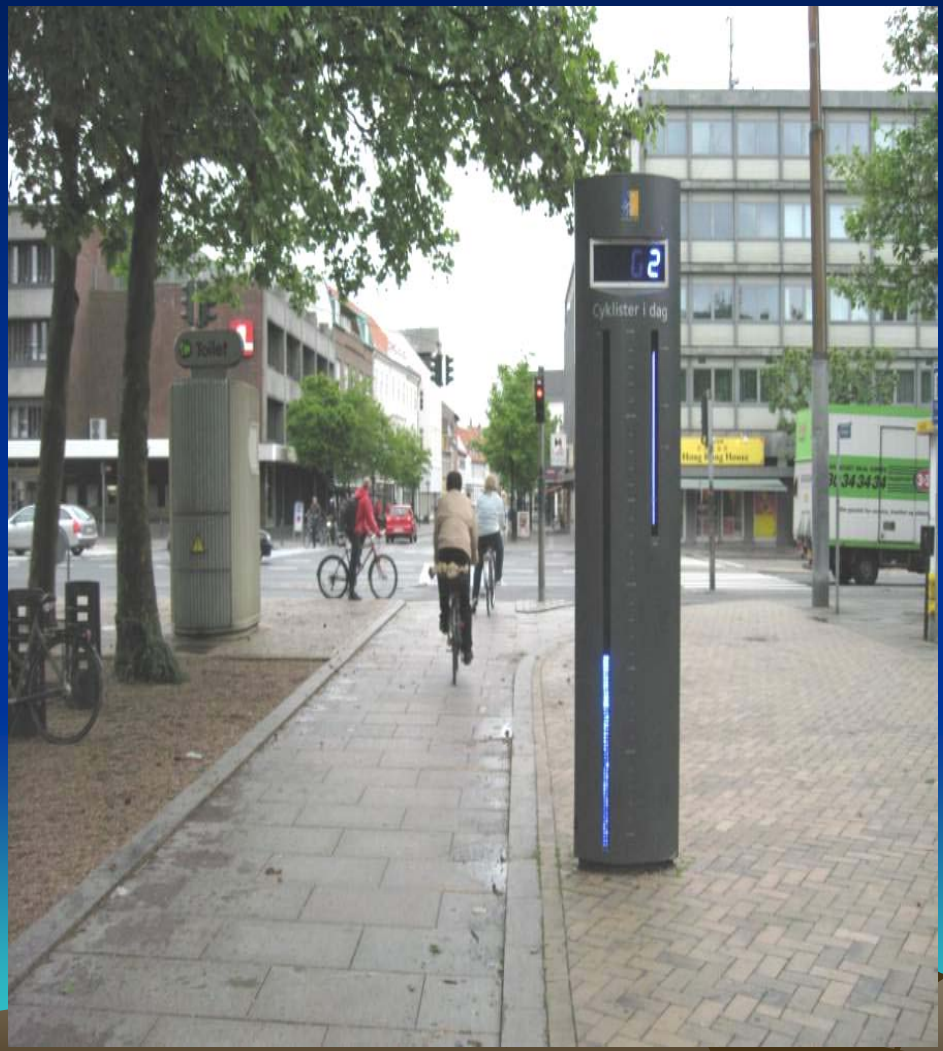
Maryland Department of Transportation

Technical Traffic Solution A/S

- Met with Troels Andersen and Ole Lund of TTS in Odense, Denmark on 5/26/08
- Odense has been designated as Denmark's "Cykel City"
- Troels and Ole shared innovative design features marketed by TTS.

Bicycle Column Traffic Counter



Urban Equipment / Cyclism

Bicycle Column

TTS has developed an intelligent column for use in an urban environment. The column counts the traffic of cyclist passing the column. It count the daily and the yearly traffic, and shows the number of cyclist passing the previous year. The data is saved in a PLC and can be used for statistic use. This is a good way to improve the experience of a bicycle trip.

Type:	Single or doublesided	Installation:	By customer
Material:	Aluminium	Electrical inst.:	230V
Color:	Standard RAL color of customer choice		Detectors are connected with the loops
Foil:	Reflex foil - Class 3	Foundation:	Steel foundation is incl.
	Text, logo and scale by customer choice		Casted with concrete on sight (900mm)
Datacollection:	Cable is connected directly to PLC in column	Delivery:	Assembled
Detectors:	3 psc. 2-channels detectors	Option:	With anti graffiti paint
			With more detectors

Green Wave

Urban Equipment / Cyclism

Green Wave

As an extra motivation factor for bicyclists and also to minimize the numbers of stops at a red light TTS has developed a Green Wave which tells the ciclists to go at a certain speed and hereby getting a Green Wave through a number of trafic lights.

Design: Municipality of Odense and TTS.

Green Wave, Odense

Gron beige 22 km/t

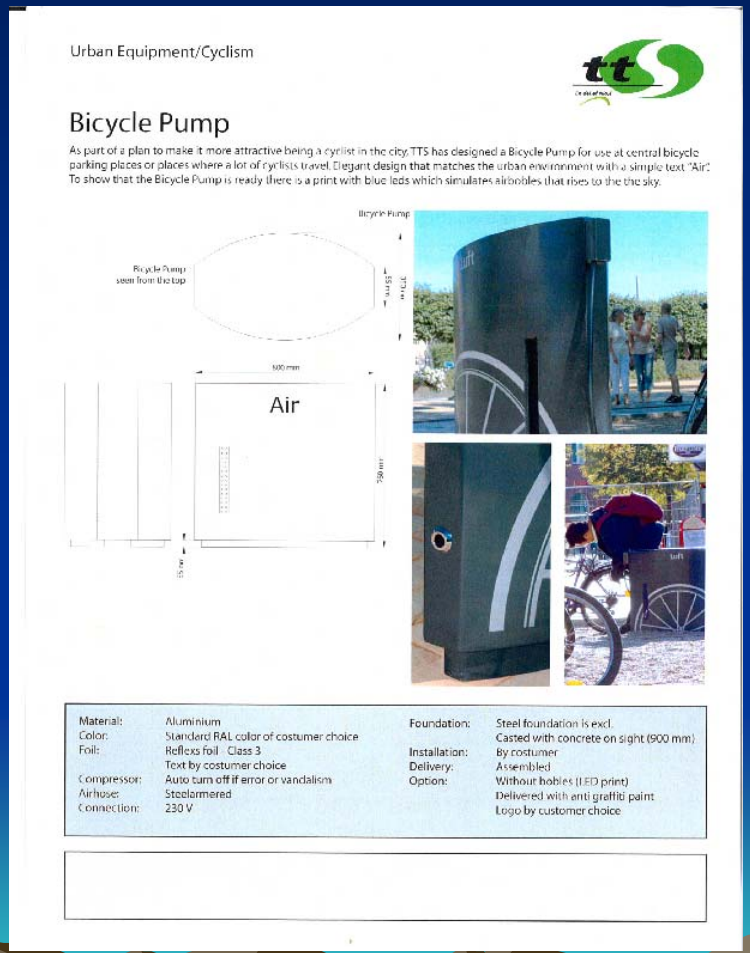
Material:	Aluminium	Mounting:	For casting in concrete
Surface:	Galvanised	Options:	Bollard in design of costumer.
Weight:	App. 5 kg.		Painted in RAL colour of costumer wish.
Installation:	By costumer		With antigraffiti paint.
Delivery:	Assembled		

Art no.:	Green Wave bollard
	Green Wave In-pavement light
	Green Wave controller

- Minimizes red light stops for bicyclists
- Limited to specific corridors and times of day
- Used in Copenhagen and Odense, Denmark
- Cyclists pedal at posted speed to catch green signals en route.
- Green and red light signaling posts en route

Green Wave Signs and Symbols

TTS Compressed Air Pump



Urban Equipment/Cyclism

Bicycle Pump

As part of a plan to make it more attractive being a cyclist in the city, TTS has designed a Bicycle Pump for use at central bicycle parking places or places where a lot of cyclists travel. Elegant design that matches the urban environment with a simple text "Air". To show that the Bicycle Pump is ready there is a print with blue leds which simulates airbobbles that rises to the the sky.

Bicycle Pump

Bicycle Pump seen from the top

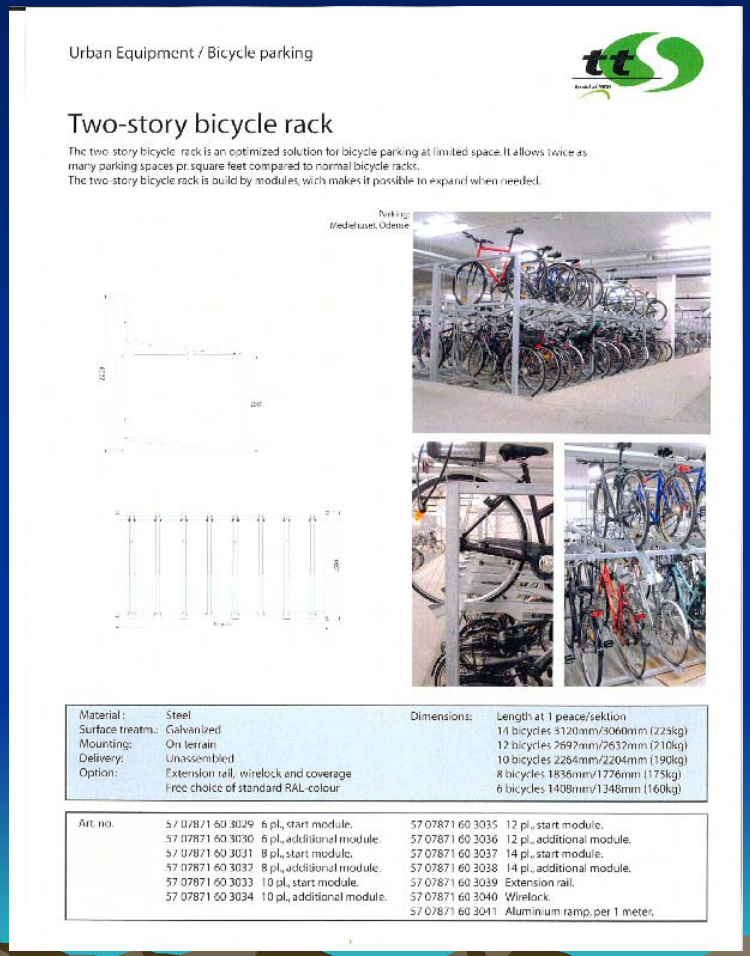
Air

Material:	Aluminium	Foundation:	Steel foundation is excl.
Color:	Standard RAL color of costumer choice		Casted with concrete on sight (900 mm)
Foil:	Reflexs foil Class 3	Installation:	By costumer
	Text by costumer choice	Delivery:	Assembled
Compressor:	Auto turn off if error or vandalism	Option:	Without bobles (LED print)
Airhose:	Steelarmered		Delivered with anti graffiti paint
Connection:	230 V		Logo by customer choice

TTS Compressed Air Pump

- Ole Lund of TTS says placement of compressed air pump at bicycle parking garages tells cyclists' "We care about you"

Two-story bicycle rack



Urban Equipment / Bicycle parking

Two-story bicycle rack

The two-story bicycle rack is an optimized solution for bicycle parking at limited space. It allows twice as many parking spaces pr. square feet compared to normal bicycle racks.
The two-story bicycle rack is build by modules, wich makes it possible to expand when needed.

Parking:
Medelhuset, Odense

Material:	Steel	Dimensions:	Length at 1 peace/sektion
Surface treatm.:	Galvanized		14 bicycles 3120mm/3060mm (225kg)
Mounting:	On terrain		12 bicycles 2692mm/2632mm (210kg)
Delivery:	Unassembled		10 bicycles 2264mm/2204mm (190kg)
Option:	Extension rail, wirelock and coverage		8 bicycles 1836mm/1776mm (175kg)
	Free choice of standard RAL-colour		6 bicycles 1408mm/1348mm (160kg)

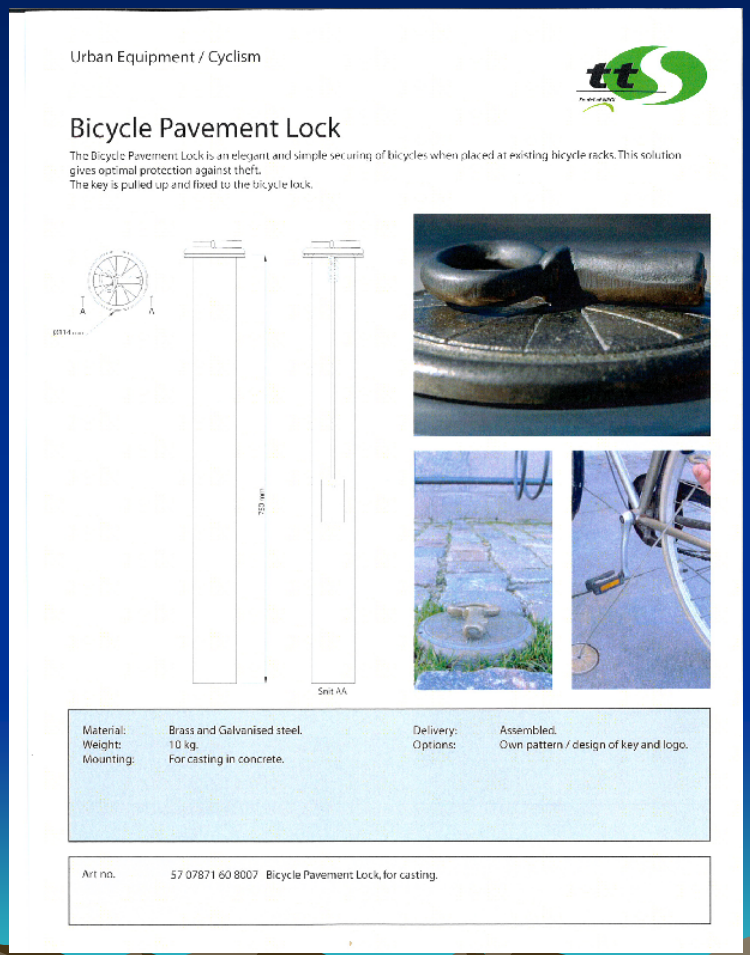
Art. no.			
	57 07871 60 3029 6 pl., start module.	57 07871 60 3035	12 pl., start module.
	57 07871 60 3030 6 pl., additional module.	57 07871 60 3036	12 pl., additional module.
	57 07871 60 3031 8 pl., start module.	57 07871 60 3037	14 pl., start module.
	57 07871 60 3032 8 pl., additional module.	57 07871 60 3038	14 pl., additional module.
	57 07871 60 3033 10 pl., start module.	57 07871 60 3039	Extension rail.
	57 07871 60 3034 10 pl., additional module.	57 07871 60 3040	Wirelock.
		57 07871 60 3041	Aluminium ramp, per 1 meter.

- For high demand bicycle parking locations
- Saves space
- Easy to lift front wheel of bike to top tier wheel rail

Two-story bicycle rack

- Movable tire rail track grasps front bike tire
- Top level parking is easy for even petite bicyclists

TTS Bicycle Pavement Lock



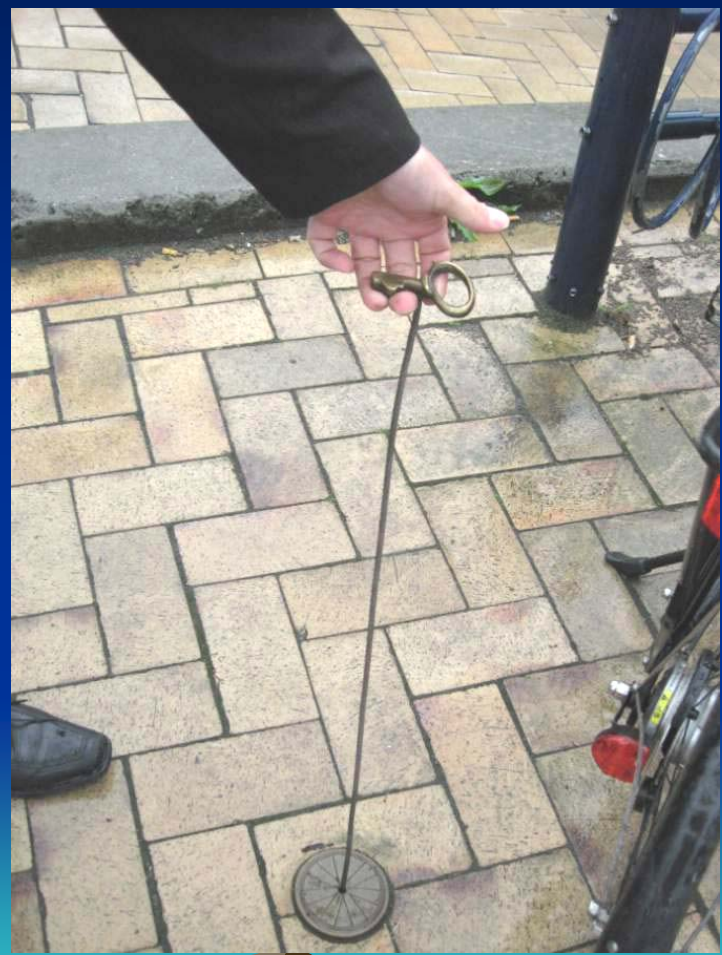
Urban Equipment / Cyclism

Bicycle Pavement Lock

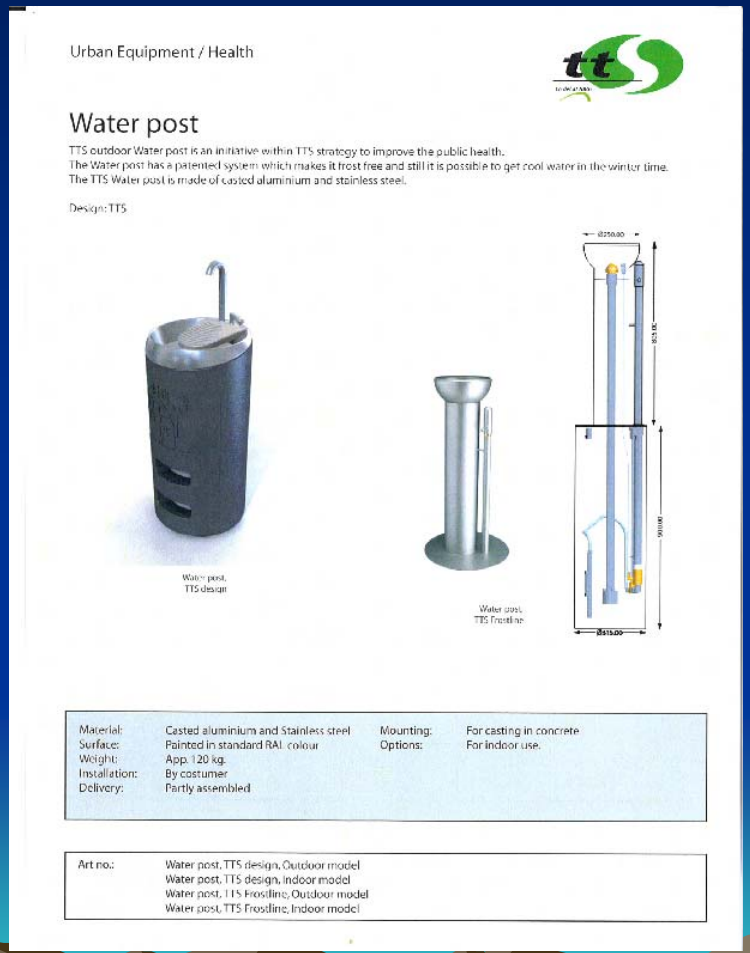
The Bicycle Pavement Lock is an elegant and simple securing of bicycles when placed at existing bicycle racks. This solution gives optimal protection against theft.
The key is pulled up and fixed to the bicycle lock.

Material:	Brass and Galvanised steel.	Delivery:	Assembled.
Weight:	10 kg.	Options:	Own pattern / design of key and logo.
Mounting:	For casting in concrete.		

Art no. 57 07871 60 8007 Bicycle Pavement Lock, for casting.



TTS Year Round Outdoor Drinking Fountain



Urban Equipment / Health

Water post

TTS outdoor Water post is an initiative within TTS strategy to improve the public health.
The Water post has a patented system which makes it frost free and still it is possible to get cool water in the winter time.
The TTS Water post is made of casted aluminium and stainless steel.

Design: TTS

Water post,
TTS design

Water post,
TTS Frostline

Material:	Casted aluminium and Stainless steel	Mounting:	For casting in concrete
Surface:	Painted in standard RAL colour	Options:	For indoor use.
Weight:	App. 120 kg.		
Installation:	By costumer		
Delivery:	Partly assembled		

Art no.:	Water post, TTS design, Outdoor model
	Water post, TTS design, Indoor model
	Water post, TTS Frostline, Outdoor model
	Water post, TTS Frostline, Indoor model

- Marketed as a public health strategy
- Patented frost-free system allows cool drinking water in winter time
- Waterline plumbing extends below soil frost line

Cyclists' Speed Display Sign

Urban Equipment / Cyclism

Cyclist Speedometer

Information and communication is very important while nurcing the cyclists.
The speedometers from TTS let the cyclists see their actual speed and thereby feel a real part of the traffic.
The system has been implanted in Denmark with success and is considered a natural part of product to promote cylism.

Design: TTS.

Material:	Aluminium
Surface:	Galvanised
Weight:	App. 15 kg.
Installation:	By costumer
Delivery:	Assembled
Mounting:	For casting in concrete
Options:	Painted in RAL colour of costumer wish.

Art no.:	Green Wave Speed display
	Green Wave Mast
	Green Wave controller

- Permanent Speed Display
- Marketed by TTS as making cyclists feel like part of the traffic flow
- Could be used on shared use paths (e.g. Capital Crescent Trail?)

See-Me RFID Technology

Technical Traffic Solution A/S

En del af NRGi

SEE-MI

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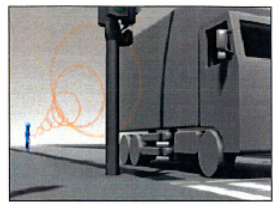
En del af NRGi

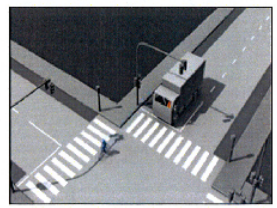
See-mi technology

See-mi is a technology that facilitates communication between lorries, bicycles and traffic lights at dangerous junctions. By means of this communication, the driver at right turning lorry is made aware of the risk of cyclists on his right side. This gives the driver an additional possibility of avoiding dangerous situations. The see-mi technology works as follows: When a bicycle approaches a junction, a signal is transmitted from the bicycle to a receiver installed on the traffic lights of the junction.



This activates a specially designed light signal, which is positioned at the lorry driver's eye level. The signal informs him that there are cyclists on his right side or in front of the lorry and that he should pay extra attention.

The See-mi technology can be adopted to the particular coverage area. It is possible to cover the entire area along the right side of the lorry including any blind angles that the lorry driver might have. Additionally, it is possible to cover areas in front of the lorry where cyclists might hide out of the driver's field of vision. The See-mi technology that is to be placed on the bicycles is incorporated into the bicycle's compulsory reflector.



Bike Equipped See-Mi Reflectors

Technical Traffic Solution A/S

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Good reflectors are not always enough

Normal, good-quality bicycle reflectors are designed to reflect light. See-mi reflectors also reflect light, but provide far greater additional protection for cyclists in dangerous areas such as at traffic lights.
A See-mi reflector looks just like a normal bicycle reflector that goes on the front of your bike. It is the same size and is fitted in the normal way. Apart from fitting it to the bike, users do not need to do anything to make the reflector active.
The extra protection is a result of the active See-mi reflector being linked to the See-mi system. When a bicycle approaches a traffic light equipped with the See-mi technology, the reflector will be activated. This starts a communication between the bicycle and sensors in the traffic light. Special cyclist signals in the traffic lights will then warn car drivers of bicycles on their right-hand side.
The See-mi system uses RFID technology. The reflector contains inbuilt RFID components that enable it to communicate with RFID equipment installed in the traffic lights.
The reflector is battery-operated, but only uses the battery when it is activated near a traffic light. When used normally, the battery has a life span of up to four years. A small device will indicate when battery is low. Normal use is defined as approximately 10 km daily cycling during which the reflector is activated 20 times.

See-mi reflector

Reflector without See-mi

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They have noticed us already

See-mi has had quite a bit of media coverage already. There is great interest in the problem of accidents caused by right turns. Both in Denmark and internationally, there is a strong interest in finding an innovative solution, and RFID technology is being discussed in connection with the big problem of right-turning lorries whose drivers cannot see cyclists on their right sides due to blind spots.

Newspapers and magazines:
Business.dk, 27 December 2007
Comon, 12 December 2007
Ingeniøren, 12 December 2007
Djurslandsposten, 14 December 2007
Århus Stiftstidende, 15 June 2006
Skanderborg ugeavis, 21 June 2006
Erhvervsbladet, 21 June 2006
Viborgs Stiftsfolkeblad, 31 January 2006

TV:
See-mi in Go' morgen Danmark, January 2008
See-mi in the TV2 news, December 2007
See-mi in the TV2 news, June 2006

The wide coverage has led to several presentations in Denmark and internationally, and the See-mi test has put Grenå on the world map.

Dan Jørgensen

Dan Jørgensen, a member of the European Parliament for the Danish Social Democrats, has followed the See-mi project with interest for a long time.
Dan Jørgensen states:
"I am happy and proud of the test in Grenå and believe that this system can potentially save lives.
It would be wonderful if we could help popularise a system that can save lives in traffic in all countries."

Read more on the internet

- www.idzone.dk/see-mi.html
- www.curodrivers.dk
- http://www.treehugger.com/authors/index.php?author=april
- http://www.treehugger.com/files/2007/12/rfid_lights_up.php
- http://www.nsfk.com/2007/12/see-mi-helps-cyclists-stay-safe.html
- http://www.nsfk.com/author/christine-huang/
- http://www.velorution.biz/?p=1396
- http://www.rfidweblog.de/contributors.php

Truck Mounted Bike Warning Sign

- Green sign on truck reads, “Bicyclists if you cannot see my mirrors I cannot see you.”
- Warns bicyclists to stay out of driver’s blind spots

I Bike Copenhagen

Why Bike CPH?

- Danish tax laws impose 200% sales tax on cars
- Fuel is the equivalent of $9.00 plus per gallon
- City has great bicycling and public transit facilities
- CPH is very walkable

Copenhagen Public Use Bicycle

Copenhagen Public Use Bicycles

CPH Public Use Bicycles

Bicycle Favoritism in CPH

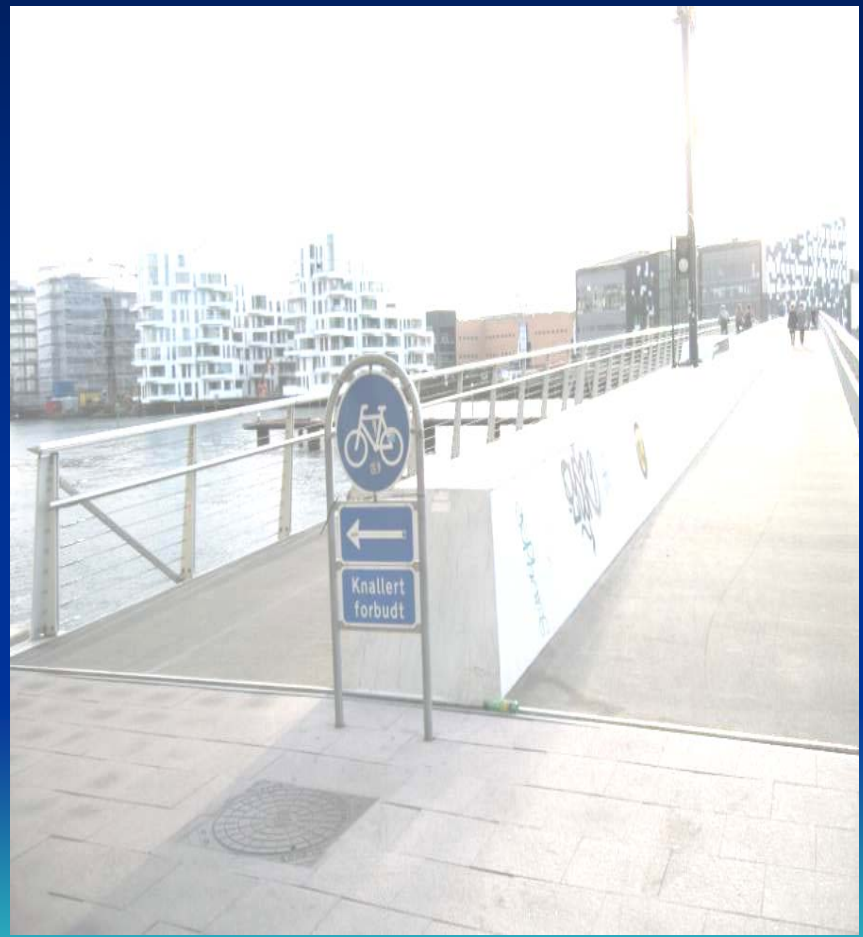
- One-way street sign is for motorists only
- Bicyclists may travel in both directions

Family Friendly Bicycling in Copenhagen

Copenhagen Bike Facilities

- Blue Bike Lanes at intersections
- Rail-to-Trail Bike Path Bridge

Major Bike/Ped Only Bridge in Copenhagen



Copenhagen Weather Building

Specialized Danish Bicycles

Overflowing bike parking in CPH

Copenhagen Public Works Communications

Du står midt i et udviklingsprojekt!
I det kommende år igangsætter Københavns Kommune seks markante initiativer i Metropolzonen. Initiativerne skal gøre Københavns centrum til et unikt storbyhjerte. Ambitionen er, at Metropolzonen både skal være et sted københavnerne bruger i hverdagen og byens visitkort, der viser hele verden, hvad København vil stå for i det 21. århundrede.

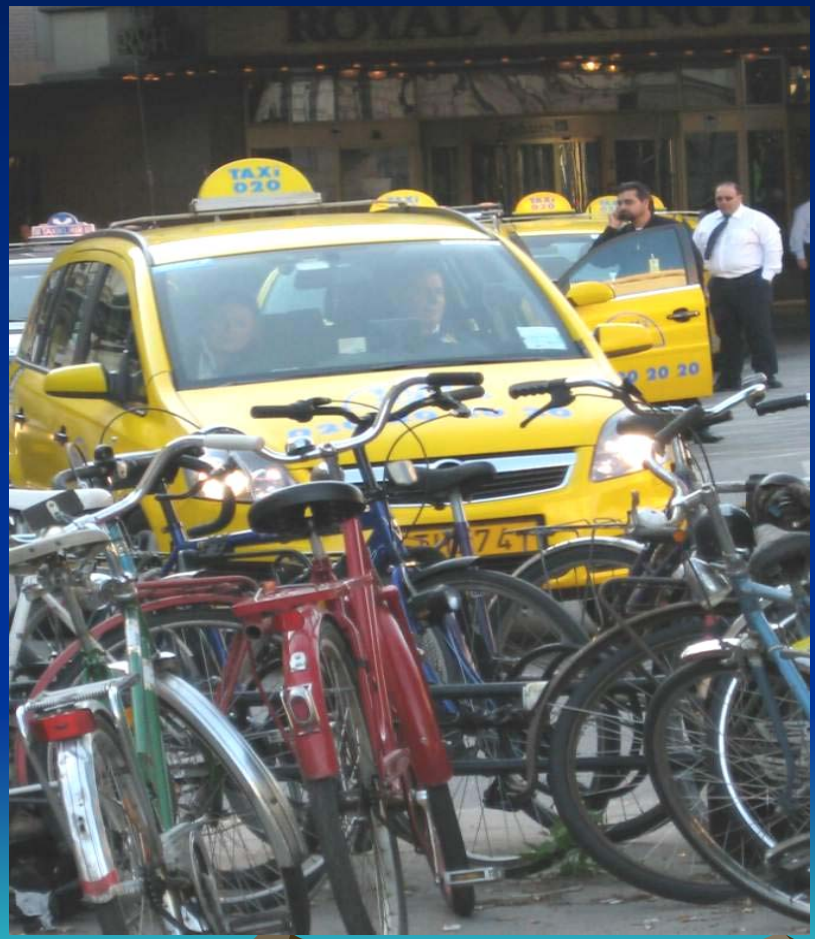
You are standing in the middle of a development project!
In the year to come, The City of Copenhagen will implement six significant initiatives in the Metropol Zone. The initiatives will make the Copenhagen city centre a unique heart of the Metropolis. The ambition is to create a Metropol Zone that is both a part of every day life for the people of Copenhagen and the city's visiting card showing the world what Copenhagen will stand for in the 21st Century.

Tivoli

Københavns Kommune har indledt en dialog med Tivoli om, hvordan man kan skabe nye oplevelser langs kanten af den gamle have. Tanken er, at Tivolis bygninger langs kanten kan lukkes op og i højere grad blive til glæde for livet i de omkringliggende byrum. Der er særligt fokus på Bernstorffsgade.

The City of Copenhagen has begun negotiations with Tivoli on how to create new entertainment facilities along the edges of the old garden. The idea is to open up the buildings lying alongside Tivoli in order to liven up the surrounding area. There is particular focus on Bernstorffsgade.

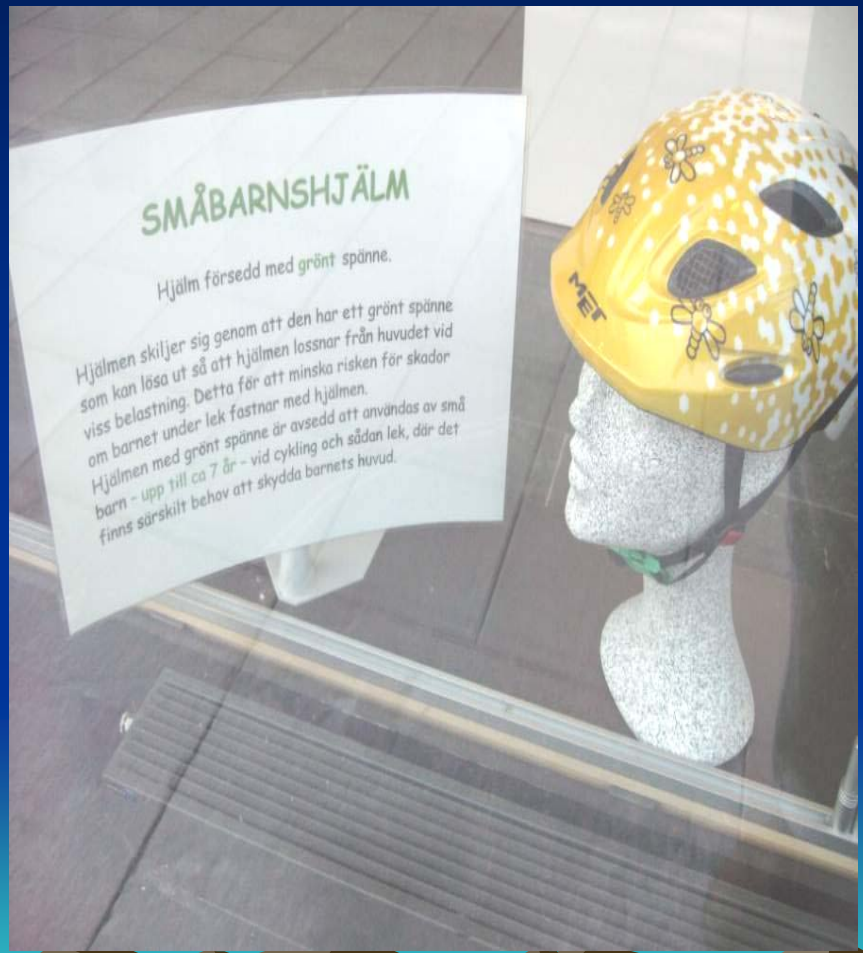
Stockholm Rail Station Vicinity



Uppsala, Sweden

- Ancient Swedish University community
- City Hall building displays traffic and bicycling information in attractive sidewalk window displays facing Main Street

Uppsala Window Displays



Uppsala Bike Safety Window Display