Frukostseminarium om cykling, samhällsekonomi och finansiering

Sjöfartshuset, Gamla stan 16 maj 2018

SVENSK CYKLING · SVENSKA CYKELSTÄDER · CYKEL FRÄMJANDET · TUB Trafikutredningsbyrån AB

Program

- **Välkommen**
  Moderator Pelle Envall, VD på Trafikutredningsbyrån
- **Så ser behoven ut**
  Henrik Oretorp, ordförande Svenska Cykelstäder
- **Cykling en vinst för samhället?**
  Stefan Gössling, professor vid Linnéuniversitetet, School of Business and Economics.
- **Panelsamtal**
  Nina Lundström (L), Meeri Wasberg (S), Lorentz Tovatt (Mp) och Gustav Hemming (C)

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The cost of cycling

Stefan Gössling

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SVENSKA DAGBLADET Nyheter Näringsliv Kultur Ledare Debatt Tidningen

”Snabba tåg stöds varken av klimat eller ekonomi”

Höghastighetsbanor i Sverige kan komma att framstå som klimatbovar om de byggs, på grund av projektets gigantiska kostnader och osäkerheten om de verkligen leder till minskade utsläpp. Det skriver professor emeritus Per-Olov Johansson och professor Bengt Kriström.

svt NYHETER Nyheter Lokalt Sport SVT Play Barn

/ UTRIKES

Flygskatten träder i kraft den första april och en avståndsbaserad skatt, det vill säga ju längre man flyger desto dyrare är skatten. Foto: Håkon Mosvold Larsen/TT, Fredrik Sandberg/TT

I april införs nya flygskatten – SAS hotar flytta avgångar

Sverige är ett av världens billigaste flygländer. Men att kunna fynda en flygbiljett för under hundralappen till Berlin eller London kommer snart vara ett minne blott. Från den första april införs en nationell flygskatt i Sverige.

Regeringskansliet

Lyssna English website Lättläst Teckenspråk Other languages Prenumerera via e-post Kontakt

Jobba hos oss Webb-tv Press Sverige i EU UD:s reseinformation

Sök på regeringen.se Sök

Sveriges regering
Statsråden och departementen

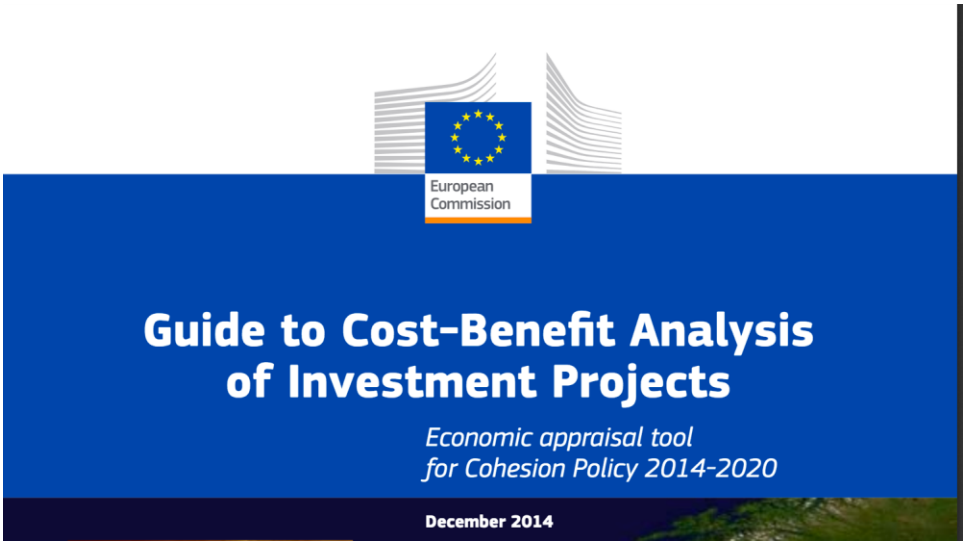
Regeringens politik
Detta görs inom olika områden

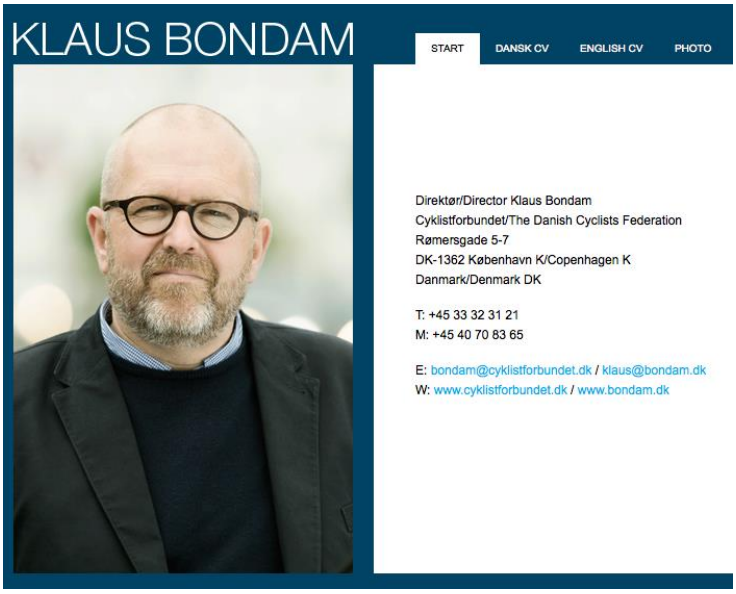
Så styrs Sverige
Om regeringen, Regeringskansliet och EU

Ökad cykling en strategisk framtidsfråga

Dagens Industri, 18 januari 2017

Regeringen tar nu beslut om kraftig medfinansieringen av cykelinfrastruktur i Sverige genom stadsmiljöavtal.





2006 – 2010: Borgmästare Köpenhamn (miljö & bygg)

Cost of cycle infrastructure – too high for communities?

- Cost-benefit analysis standard tool for assessment of new infrastructure;
- Focus almost always on car, with predictable outcomes;
- Why Copenhagen sparked a revolution:
  1. Comparison of car and bicycle (per pkm)
  2. Consensus of political parties regarding parameters and factor costs

Parameters in Copenhagen:

- Operational costs
- Travel time costs
- Accident costs
- Air pollution
- Health effects

CBA parameter	Methodology to quantify effect
Vehicle operating costs	Change in vehicle kilometre by mode, i.e., for different motorized vehicles, public transportation and bicycles.
Time costs	Change in transport time by transport mode.
Accident costs	Change in the number of accidents with and without bicycles involved.
Pollution and related externalities	Change in vehicle kilometres for each mode of transportation.
Recreational value[a]	Change in cycle kilometres and cyclists' statements.
Health benefits	Change in cycle kilometres.
Safety[a]	Change in the number of accidents, cyclist statements and change in cycle kilometres.
Discomfort[a]	Change in cycle kilometres.
Branding, tourism, and open land value[a]	Not considered to be traffic effects

[a] Not included/measured in the CBA.

Results:

Social and private costs:

Costs car: 50 Cent/pkm, costs bicycle: 8 Cent/pkm

Social costs:

Costs car: **15 Cent/pkm**, benefit bicycle: **16 Cent/pkm**

Average cost per kilometre for cycling/car, summary for 2008 (Euro).
Source: COWI and Københavns Kommune (2009).

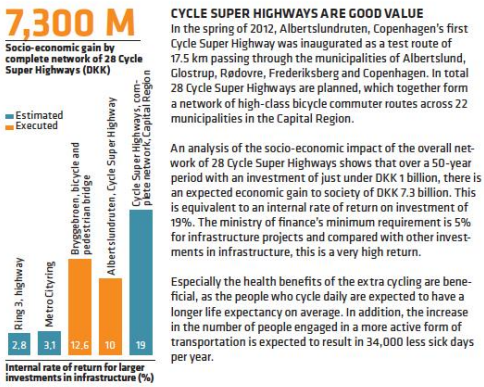
	Cycling (16 km/h)			Car (50 km/h)			
	Private	Social	Total	Private	Social	Duties	Total
Time costs (travel time)	0.672	0	0.672	0.215	0	0	0.215
Vehicle operating costs	0.044	0	0.044	0.296	0	−0.159	0.137
Prolonged life	−0.358	0.008	−0.348	0	0	0	0
Health	−0.149	−0.242	−0.391	0	0	0	0
Accidents	0.034	0.073	0.105	0	0.030	0	0.030
Perceived safety	+ (?)	0	+ (?)	?	?	0	?
Discomfort	?	0	+ (?)	?	?	0	?
Branding/tourism	0	−0.003	−0.003	?	?	0	?
Air pollution	0	0	0	0	0.004	0	0.004
Climate change	0	0	0	0	0.005	0	0.005
Noise	0	0	0	0	0.048	0	0.048
Road deterioration	0	0	0	0	0.001	0	0.001
Congestion	0	0	0	0	0.062	0	0.062
Total	0.243	−0.164	0.081	0.511	0.152	−0.159	0.503

Note: Car occupancy is 1.54 persons per car (DTU Transport and COWI, 2010); external values for cars are reported for gasoline cars in the city during off-peak hours. Cycling's health benefits are split into private and social benefits, it is assumed that 50% of the gain is own consumption and thus internalized. The rest is taxes, etc. In cases where unit prices cannot be estimated as yet, the table contains question marks (?). Plusses indicate where these are expected to entail a cost.

Use of results in Copenhagen:

28 bicycle highways;
DKK 1 miljard
Expected social benefit:
DKK 7.3 miljarder

Investments Copenhagen:
ca: SEK400 per capita per year, now over 10 years



CYCLE SUPER HIGHWAYS ARE GOOD VALUE

In the spring of 2012, Albertslundruten, Copenhagen's first Cycle Super Highway was inaugurated as a test route of 17.5 km passing through the municipalities of Albertslund, Glostrup, Rødovre, Frederiksberg and Copenhagen. In total 28 Cycle Super Highways are planned, which together form a network of high-class bicycle commuter routes across 22 municipalities in the Capital Region.

An analysis of the socio-economic impact of the overall network of 28 Cycle Super Highways shows that over a 50-year period with an investment of just under DKK 1 billion, there is an expected economic gain to society of DKK 7.3 billion. This is equivalent to an internal rate of return on investment of 19%. The ministry of finance's minimum requirement is 5% for infrastructure projects and compared with other investments in infrastructure, this is a very high return.

Especially the health benefits of the extra cycling are beneficial, as the people who cycle daily are expected to have a longer life expectancy on average. In addition, the increase in the number of people engaged in a more active form of transportation is expected to result in 34,000 less sick days per year.

Review CBA parameters

(EC 2014, CPH 2009, ECF 2016, VTPI 2017)

1. Climate change
2. Air pollution
3. Noise pollution
4. Land use and infrastructure
5. Traffic infrastructure maintenance
6. Soil and water quality
7. Resource requirements (LCA)
8. Vehicle operation
9. Travel time
10. Congestion
11. Health benefits
12. Accidents
13. Perceived safety & discomfort
14. Quality of life, branding and tourism

Unit costs

- Update of the Handbook on External Costs of Transport (European Commission 2014)
- Center for Transport Analytics, Denmark (2017)
- Viktoria Transport Policy Institute, Canada (2017)

⇒ **Assessment for the European Union!**

Climate change

Assessment Cars	Cost social	Cost private	Reference
Social cost of CO_2	€$_{2017}$0.011/pkm	0	Korzhenevych et al. 2014; VTPI 2017
Fossil fuel subsidies	€$_{2017}$0.003/pkm	0	Coady et al. 2017
Assessment Bicycles	**Cost**		**Reference**
Social cost of CO_2	<€$_{2017}$0.001 pkm	0	VTPI 2017
Fossil fuel subsidies	<€$_{2017}$0.001/pkm	0	Coady et al. 2017
Assessment Walking	**Cost**		**Reference**
Social cost of CO_2	<€$_{2017}$0.001 pkm	0	VTPI 2017
Fossil fuel subsidies	<€$_{2017}$0.001/pkm	0	Coady et al. 2017

Air pollution

- Global cost of air pollution: €3.9 trillion/year (Lancet Commission 2017)
- 6% of mortality in Europe
- Traffic: 39% of NO_x, 11% $PM_{2.5}$/PM_{10}, 10% NMVOCs, 20% CO, 29% BC, 1-16% heavy metals (EU28)

Assessment Cars	Cost social	Cost private	Reference
CO, $PM_{2.5}$, O_3, PM_{10}, NO_x, VOC	€$_{2017}$0.006/pkm	0	VTPI 2017
Assessment Bicycles	**Cost social**	**Cost private**	**Reference**
Air pollution	0	0	VTPI 2017
Assessment Walking	**Cost social**	**Cost private**	**Reference**
Air pollution	0	0	VTPI 2017

Noise

- EU28: 16,000 premature deaths/year (EEA 2017)
- Furthermore: Health costs, lost working time, real estate value

Assessment Cars	Cost social	Cost private	Reference
Noise, general	€$_{2017}$0.007/pkm	0	VTPI 2017
Assessment Bicycles	**Cost social**	**Cost private**	**Reference**
Noise, general	0	0	VTPI 2017
Assessment Walking	**Cost social**	**Cost private**	**Reference**
Noise, general	0	0	VTPI 2017

Land use and infrastructure

Assessment Cars	Cost social	Cost private	Reference
New infrastructure construction (roads/parking)	€$_{2017}$0.030/pkm	0	IEA 2013
Roadway land use	€$_{2017}$0.011/pkm	0	VTPI 2017
Parking land use	€$_{2017}$0.021/pkm	€$_{2017}$0.022/pkm	VTPI 2017
Lost ecosystem services	?	0	-
Assessment Bicycles	**Cost social**	**Cost private**	**Reference**
Bicycle track construction	€$_{2017}$0.002/pkm	0	Erznoznik et al. 2014
Roadway land use	<€$_{2017}$0.001/pkm	0	VTPI 2017
Parking	<€$_{2017}$0.001/pkm	<€$_{2017}$0.001/pkm	VTPI 2017
Lost ecosystem services	?	0	-
Assessment Walking	**Cost social**	**Cost private**	**Reference**
Boardwalk construction	€$_{2017}$0.002/pkm	0	Authors
Boardwalk land use	<€$_{2017}$0.001/pkm	0	Authors
Lost ecosystem services	?	0	-

Traffic infrastructure maintenance

Assessment Cars	Cost social	Cost private	Reference
Maintenance costs	€$_{2017}$0.004/pkm	0	Korzhenevych et al. 2014
Assessment Bicycles	**Cost social**	**Cost private**	**Reference**
Maintenance costs	<€$_{2017}$0.001/pkm	0	Authors
Assessment Walking	**Cost social**	**Cost private**	**Reference**
Maintenance costs	<€$_{2017}$0.001/pkm	0	Authors

Soil and water quality

Assessment Cars	Cost social	Cost private	Reference
Pollutants to soil and water	€$_{2017}$0.005/pkm	0	VTPI 2017
Assessment Bicycles	**Cost social**	**Cost private**	**Reference**
Pollutants to soil and water	<€$_{2017}$0.001/pkm	0	Authors
Assessment Walking	**Cost social**	**Cost private**	**Reference**
Pollutants to soil and water	<€$_{2017}$0.001/pkm	0	Authors

Resource requirements

Assessment Cars	Cost social	Cost private	Reference
Resource requirements	€$_{2017}$0.007/pkm	0	Korzhenevych et al. 2014
Assessment Bicycles	**Cost social**	**Cost private**	**Reference**
Energy requirements lifecycle	<€$_{2017}$0.001/pkm	0	Dave 2010
Assessment Walking	**Cost social**	**Cost private**	**Reference**
Resource requirements	<€$_{2017}$0.001/pkm	0	Authors

Vehicle operation costs

Vehicle aspect	Cost (€$_{2017}$/pkm)	Taxes and duties (€$_{2017}$/pkm)
Fuel	0.028	0.038
Tires	0.006	0.002
Repair and maintenance	0.076	0.022
Owner tax	-	0.017
Depreciation	0.030	0.045
Total	0.140	0.141

Source: Center for Transport Analytics 2017

Assessment Cars	Cost social	Cost private	Reference
Vehicle operation costs	0	€$_{2017}$0.250/pkm	Authors
Assessment Bicycles	**Cost social**	**Cost private**	**Reference**
Bicycle operation costs	0	€$_{2017}$0.047/pkm	Center for Transport Analytics 2017
Assessment Walking	**Cost social**	**Cost private**	**Reference**
Walking cost	0	€$_{2017}$0.041/pkm	VTPI 2017

Travel time

Assessment Cars	Cost social	Cost private	Reference
Travel time value	0	€$_{2017}$0.253/pkm	VTPI 2017
Assessment Bicycles	**Cost social**	**Cost private**	**Reference**
Travel time value	0	€$_{2017}$0.474/pkm	VTPI 2017
Assessment Bicycles	**Cost social**	**Cost private**	**Reference**
Travel time value	0	€$_{2017}$1.264/pkm	Center for Transport Analytics 2017, Realise 2018

Congestion

Assessment Cars	Cost social	Cost private	Reference
Congestion	0	€$_{2017}$0.355/pkm	VTPI 2017
Barrier effects	0	€$_{2017}$0.005/pkm	VTPI 2017
Assessment Bicycles	**Cost social**	**Cost private**	**Reference**
Congestion	0	<€$_{2017}$0.001/pkm	VTPI 2017
Barrier effects	0	<€$_{2017}$0.001/pkm	VTPI 2017
Assessment Walking	**Cost social**	**Cost private**	**Reference**
Congestion	0	<€$_{2017}$0.001/pkm	VTPI 2017
Barrier effects	0	<€$_{2017}$0.001/pkm	VTPI 2017

Health benefits bicycle

Assessment Bicycle	Cost social	Cost private	Reference
Improved health	€-0.193/pkm	€-0.134/pkm	Center for Transport Analytics 2017; VTPI 2017
Prolonged life	€0.007/pkm	€-0.320/pkm	Center for Transport Analytics 2017
Assessment Walking	**Cost social**	**Cost private**	**Reference**
Improved health	€-0.386/pkm	€-0.268/pkm	Center for Transport Analytics 2017; VTPI 2017
Prolonged life	€0.014/pkm	€-0.640/pkm	Center for Transport Analytics 2017

Accidents

Police, first aid, medical treatment, lost productivity, premature death.

Not included: Grief, trauma, pain.

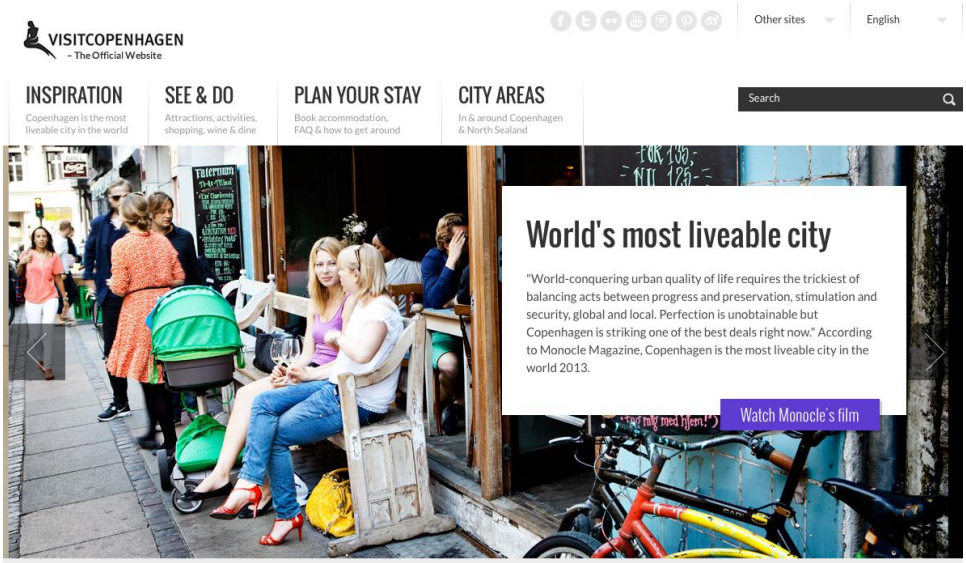
Assessment Car	Cost social	Cost private	Reference
Collisions/crashes	$€_{2017}$0.002/pkm	?	Korzhenevych et al. 2014
Assessment Bicycle	**Cost social**	**Cost private**	**Reference**
Collisions/crashes	<$€_{2017}$0.001/pkm	$€_{2017}$0.066/pkm	VTPI 2017
Assessment Walking	**Cost social**	**Cost private**	**Reference**
Collisions/crashes	<$€_{2017}$0.001/pkm	$€_{2017}$0.066/pkm	Authors

Perceived safety and comfort

- Study in cooperation with ADFC (Germany) and VCÖ (Austria), February/March 2018 (n=493)
- Respondents cycle on average 11 km per day (work/leisure)
- 76% cycle detours to avoid traffic risks, noise and air pollution
- 6.5% of all distances cycled are detours
- Cyclists WTA: €0.23/pkm, WTP €0.11/pkm

Assessment Car	Cost social	Cost private	Reference
Perceived safety and discomfort	?	?	-
Assessment Bicycle	**Cost social**	**Cost private**	**Reference**
Perceived safety and discomfort	-	$€_{2017}$0.014/pkm	Gössling et al. 2018
Assessment Walking	**Cost social**	**Cost private**	**Reference**
Perceived safety and discomfort	-	$€_{2017}$0.036/pkm	Authors

Quality of life, branding and tourism



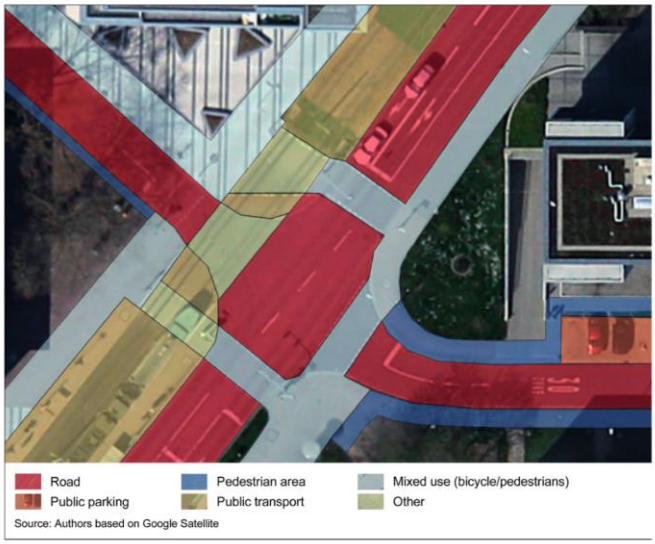
Summary

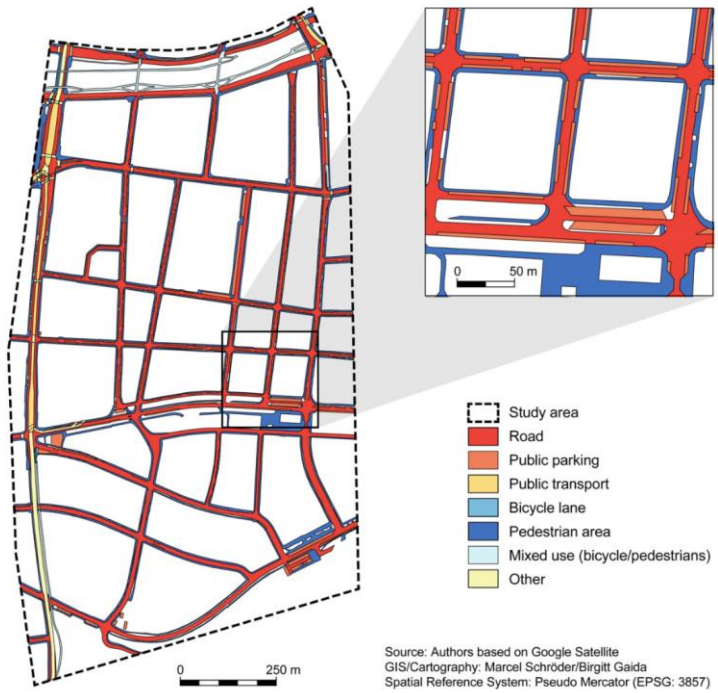
Parameter	Car, €$_{2017}$/pkm		Bicycle, €$_{2017}$/pkm		Walking, €$_{2017}$/pkm	
	Social	Private	Social	Private	Social	Private
Climate change	**0.011**	0	**<0.001**	0	**<0.001**	0
Subsidies	**0.003**	0	**<0.001**	0	**<0.001**	0
Air pollution	**0.007**	0	0	0	0	0
Noise pollution	**0.007**	0	0	0	0	0
Infrastructure Construction	**0.030**	0	**0.002**	0	**0.002**	0
Roadway land use	**0.011**	0	**<0.001**	0	**<0.001**	0
Parking land use	**0.021**	**0.022**	**<0.001**	**<0.001**	**-**	**-**
Ecosystem services	**?**	0	**?**	0	**?**	0
Traffic infrastructure maintenance	**0.004**	0	**<0.001**	0	**<0.001**	0
Soil and water quality	**0.005**	0	**<0.001**	0	**<0.001**	0
Resource requirements	**0.007**	0	**<0.001**	0	**<0.001**	0
Cycle/vehicle operation	0	**0.250**	0	**0.047**	0	**0.041**
Travel time	0	**0.253**	0	**0.474**	0	**1.264**
Congestion	0	**0.355**	0	**<0.001**	0	**<0.001**
Barrier effects	0	**0.005**	0	**<0.001**	0	**<0.001**
Health benefits	0	0	**-0.193**	**-0.134**	**-0.386**	**-0.268**
Prolonged life	0	0	**0.007**	**-0.320**	**0.014**	**-0.640**
Accidents	**0.002**	**?**	**<0.001**	**0.066**	**<0.001**	**0.066**
Perceived safety & Discomfort	?	?	-	**0.014**	-	**0.036**
Quality of life, branding and tourism	0	0	?	?	?	?
Total	**0.108**	**0.885**	**-0.184**	**0.147**	**-0.370**	**0.499**

Conclusions

- Throughout the EU, a car entails a social cost of 11 Cent/pkm, only part of which is “covered“ by taxes and duties.
- Cycling and walking generate social benefits, at 18 Cent/pkm and 37 Cent/pkm.
- Cars are consequently subsidised, while cycling and walking can be considered underfinanced.
- To make a car driver use a bicycle (or walk) is worth 29 Cents/pkm (48 Cents/pkm).
- These differences are higher in countries with higher GDP (e.g. Sweden, Denmark, Germany) as well as in cities.

Example: Space distribution





Space allocation in Freiburg, Germany

Table 4. Summary space allocation, four city quarters.

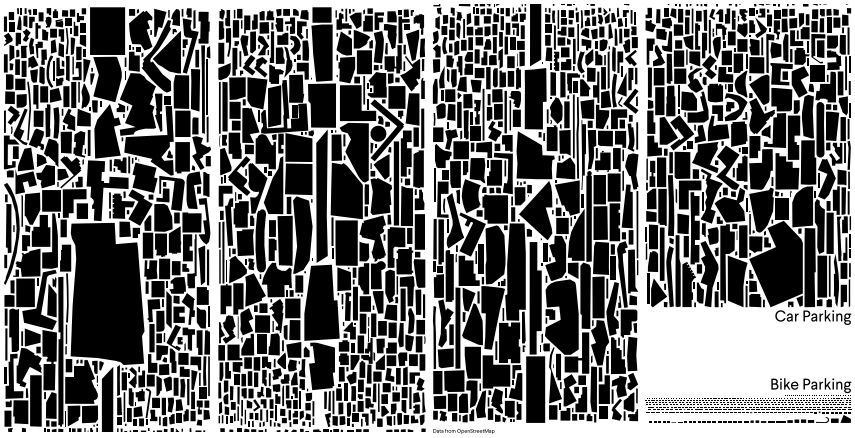
	Range (%)	Average (%)
Road	40.3–55.6	48.6
Public parking	3.8–11.9	6.6
Road and parking	*44.2–59.4*	*55.2* ⟸
Pedestrian area	15.0–33.0	24.8
Mixed use bicycle and walking	1.0–16.8	8.3
Public transport	1.4–16.3	6.5
Bicycle	1.3–4.1	2.4 ⟸
Mixed uses	1.2–4.4	2.7

In comparison:
Share of cars of trips: 21%
Share of cyclists of trips: 34%

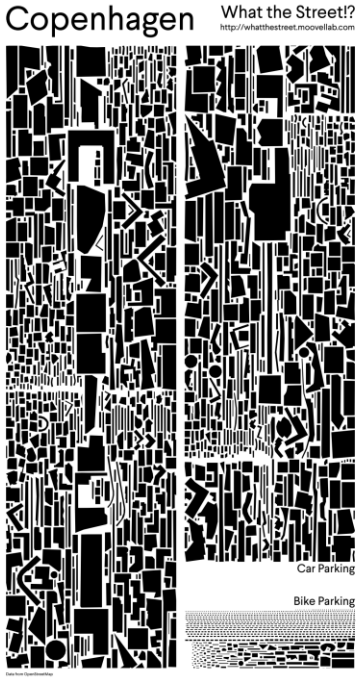
Gössling, S., Schröder, M., Späth, P., and Freytag, T. 2016. Urban space distribution and sustainable transport. Transport Reviews, http://dx.doi.org/10.1080/01441647.2016.1147101

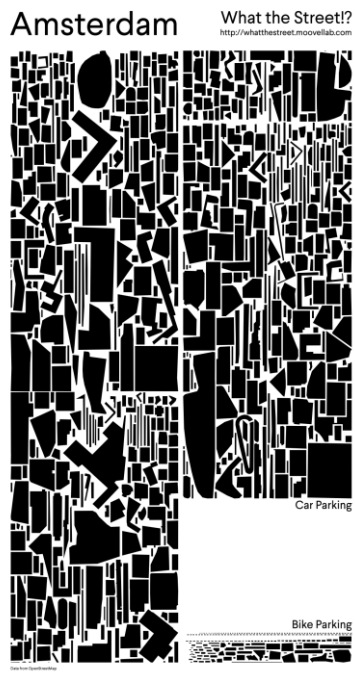
Distribution of infrastructure

Stuttgart



http://michael.szell.net/whatthestreet/posterstuttgart.pdf


Copenhagen
What the Street!?
http://whatthestreet.moovellab.com
Car Parking
Bike Parking


Amsterdam
What the Street!?
http://whatthestreet.moovellab.com
Car Parking
Bike Parking