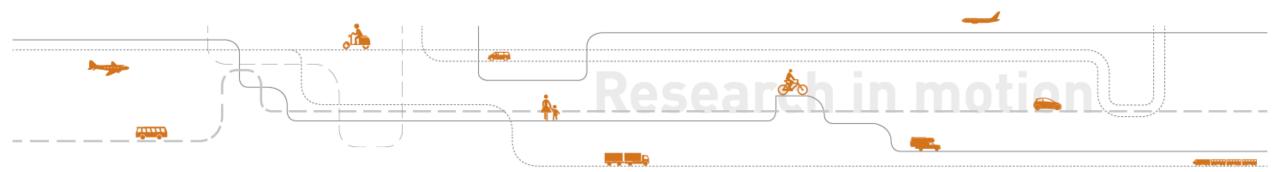


Reallocation of road and street space in Oslo: Input to discussions on measures for zero-growth in traffic

Future of Urban Mobility in the Context of Societal Challenges, Prague, 19.10.2022

Aud Tennøy, PhD Urban and Regional Planning Chief Researcher Sustainable Urban Development and Mobility Institute of Transport Economics (TØI), Norway



Important societal goals:

- Attractive cities good places to live and run businesses
- Vibrant cities city centre, people, social, lively, urbanity
- Just and inclusive cities accessibility, affordable housing
- Public health active transport, belonging, access to green
- Reducing land take bio-diversity, nature, farming, CO2
- Zero growth in road traffic volumes, CO2, energy, all above



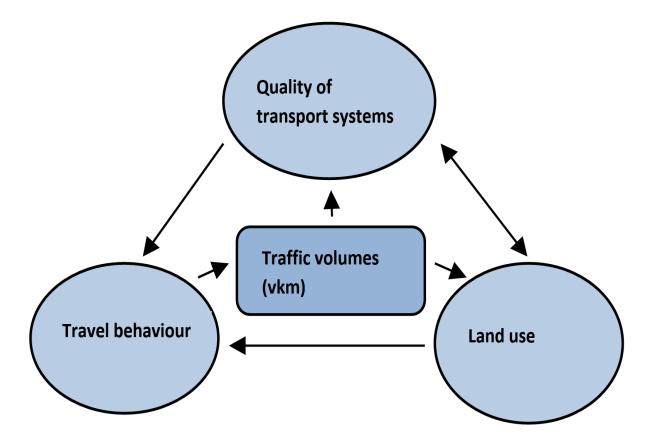
The Zero-Growth Objective

- Zero-growth: Increasing transport demand caused by rapid population growth in urban regions shall not cause growth in passenger road-traffic volumes (total VKT in the urban region), most larger cities have traffic *reduction* goals (defined in the National Transport Plan, 2013, 2017, 2021)
- Requires that inhabitants reduce their average daily car traffic volume (VKT) by making fewer trips, shorter trips and/or lower shares of trips as car drivers
- Strategy: Developing land use and transport systems in ways reducing transport demand, car dependency and traffic volumes



Strategies for achieving zero-growth or reduction

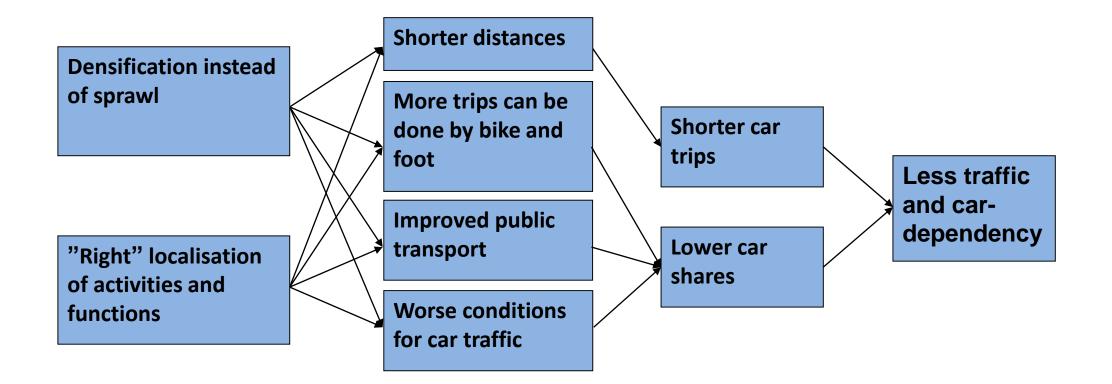
 Land use development as central densification and transformation rather than sprawl





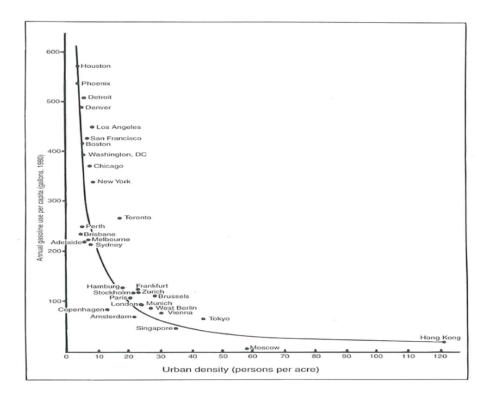
Land use – traffic volumes

Land use defines the frame conditions for travel behaviour: Where, how often and by what mode

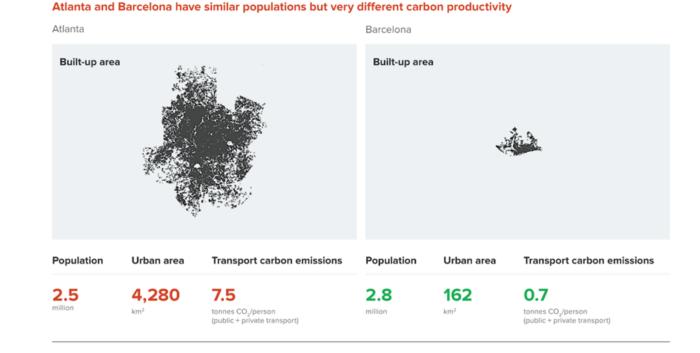




High overall densities result in less traffic (and land take)



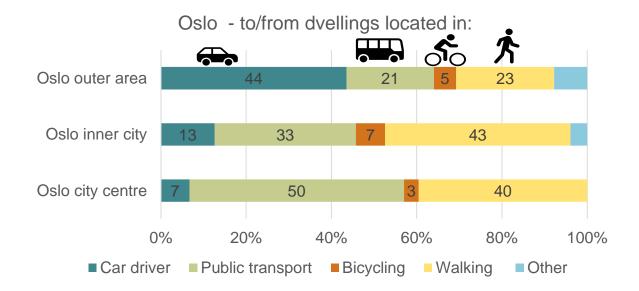
Newman og Kenworthy (1989)

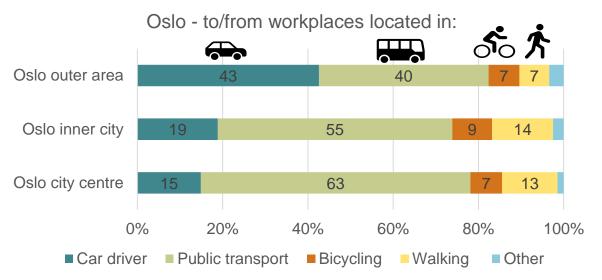


Bertaud og Richardson 2004



Localization in urban structure affects modal choice





Tennøy et al. (2021; 2022), based on NTS 2013/14 og 17/18



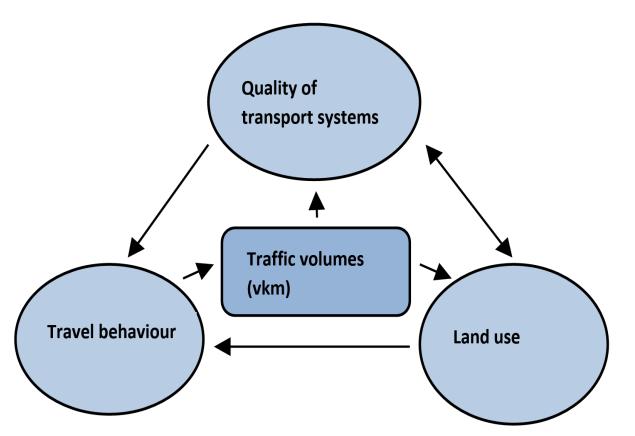
Quality of transport systems: We get more of what we facilitate for

- If we want people to shift from private car to other modes, the *relative competitiveness* of those modes versus the car needs to improve
- If we want people to shift from other modes to the private car, the *relative competitiveness* of the private car versus other modes needs to improve



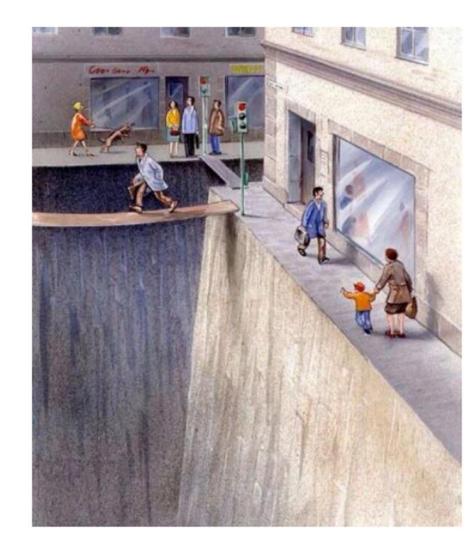
Strategies for achieving zero-growth or reduction

- Land use development as central densification and transformation rather than sprawl
- Improving conditions for walking and bicycling
- Improving public transport services
- Restrictions on accessibility by private car
- Road tolling as a restrictive measure and for funding



Reallocation of road and street space to other modes

- Obvious part of the solution when aiming at improving the competitiveness of sustainable modes versus the private car
- Often hindered by exaggerated fear of chaos and negative consequences
- Cairns et al. (2002)



The BYTRANS project

Substantial changes planned in the Oslo transport systems in 2015-2020



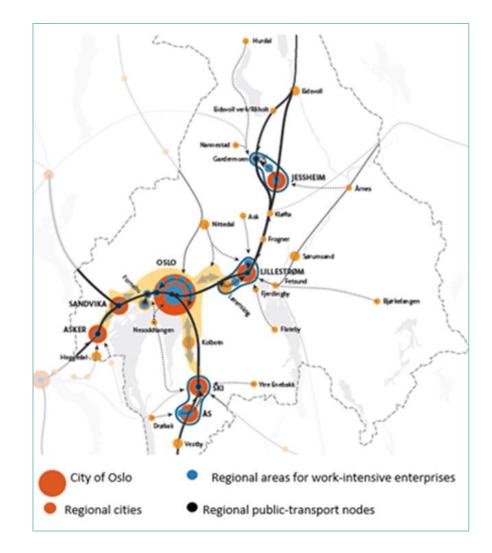
Natural experiments!

Great opportunity for research, knowledge production, learning and innovation



Context: Oslo Urban Region

- Approximately 1,3 million inhabitants (2018)
- Strong population growth:
 - 20% from 2008-2018 in the region
 - By 60 000 in the region 2014-2019
 - Of these 30 000 in Oslo municipality 2014-2019
- Stated objectives:
 - Halving CO2-emissions from 2015-2030
 - Oslo: Reducing traffic volumes by 20% by 2023
- Regional plan (2015)
 - Stopping sprawl, densification in selected 'regional towns', much of the development in Oslo city
 - Rail, subway and road infrastructure projects



The BYTRANS project

- Studying adaptions to, and effects and consequences of, changes in urban transport systems
- Cases: Main road tunnels, city centre, subway-system, other, total
- Key data collection methods (referred to here):
 - Traffic data (volumes and speed) from local and national road authorities
 - Surveys to and interviews with commuters to businesses located within Oslo municipality, every year from 2015 to 2019, 5400 – 6500 respondents per survey



Capacity reduction in 10 main road tunnels A 'proxy' for reallocating road space to other uses

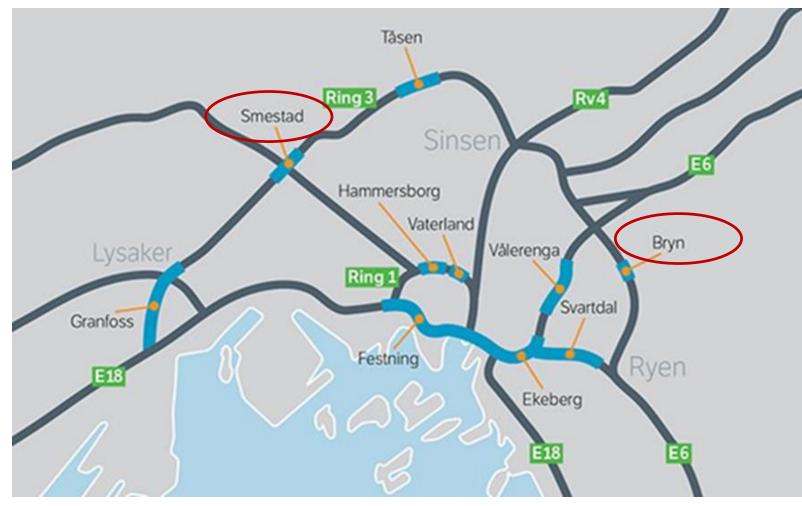
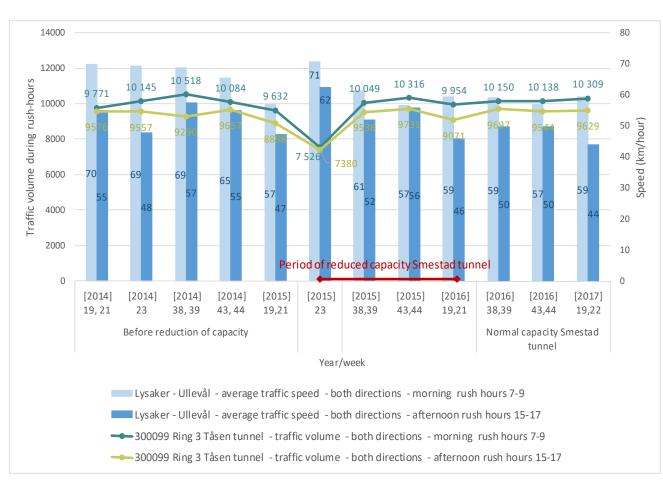


Illustration: Norwegian Public Roads Administration



Case Smestad tunnel

- AADT 50 000
- Capacity reduction, 4 to 2 lanes
- June 2015 to June 2016
- Speed limits reduced from 70 to 50 km/h
- Expected significantly increased congestions (4 hours extra was mentioned!)
- Successful information campaign
- Traffic down 37% and 33% first day (in rush) and down in total system
- No reduction in average speed
- In stable situation (with 2 lanes):
 - Traffic volumes back to normal
 - Average speeds as normal
 - Somewhat increased variability
- Had enough capacity, also with two lanes
- No adaptations, effects or consequences
- Exaggerated fear of negative consequences



Tennøy et al. (2016)



Smestad morning rush hour traffic, 2 May 2015



Photo: Aud Tennøy



Photo: Norwegian Public Roads Administration



Case Bryn tunnel

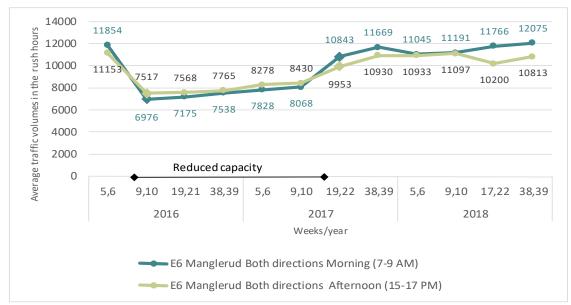
- AADT 70 000 vehicles per day
- Already (somewhat) congested during rush hours
- Capacity reduction, 4 to 2 lanes, from February 2016 to April 2017(14 months)
- Speed limits reduced from 70 to 50 km/h
- Successful information campaign
- Expected significantly increased congestions here and in the wider road transport system ('chaos')





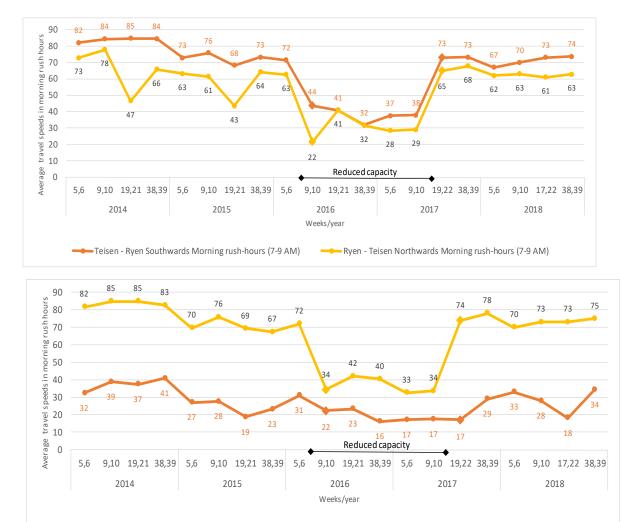
Bryn tunnel – changes to the traffic situation

- Traffic reduction in the tunnel: 26-34% during rush hours, 23 % per day (working days)
- Speed was significantly reduced in rush hours
- The disturbances were mainly limited to the areas close to the tunnel (we checked)
- 2-4% traffic increase on local roads



Traffic volumes, rush hours

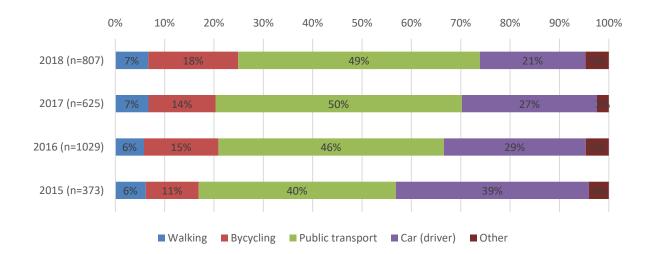
Average speed, rush hours



----- Teisen - Ryen Southwards Afternoon rush-hours (15-17 PM)

Adaptation, commuters to businesses in the Bryn area

- Most continued travelling as before
- Some chose other routes on the main road system
- Some adjusted times (but no 'rush hour slide')
- Small increase in home office usage
- Major change in modal choice on commutes
 - Subway line serving the area was reopened in 2016





Effects and consequences for commuters to the Bryn area

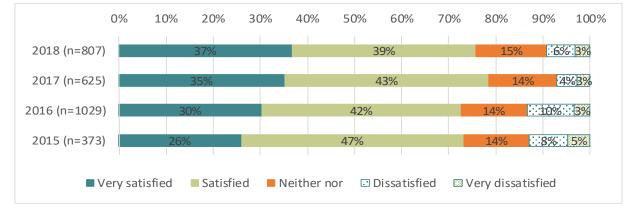
Effects

- Increased travel time (7,5 12 minutes in rush hours and rush directions)
- Worsened punctuality

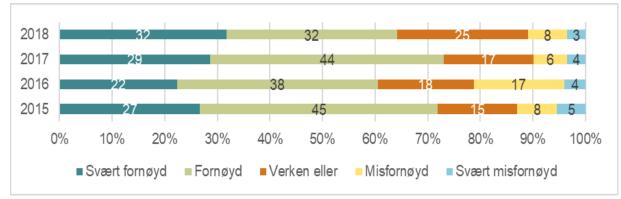
Consequences

- Routine changes in the household (12%)
- Commute satisfaction, all, no significant changes
- Commute satisfaction for car users reduced
 - 21% dissatisfied in 2016, 60% satisfied
- Effects and consequences far less severe than expected

How satisfied are you with your commute? All.



How satisfied are you with your commute? Car drivers.





Case Oslo city centre: Reallocation of street and parking space to other uses

- 2018: Most (760) on-street parking spaces removed
- 2019: Through-driving barriers
- Bike-lanes, wider sidewalks, more pedestrian areas
- Some feared people would stop using the city centre





Hagen and Tennøy (2021)

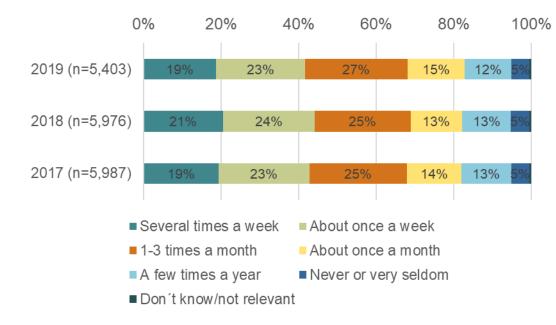
Photos: Oddrun Helen Hagen, TØI



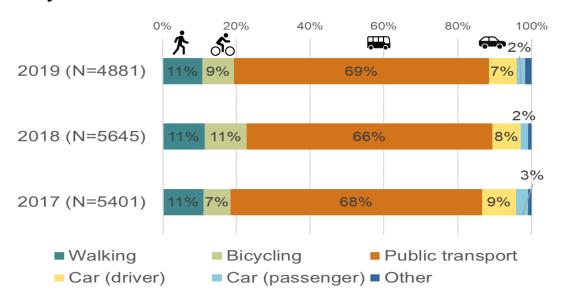
Adaptations: How often they visit, how they travel

Leisure trips, except travels to/from work

How often do you visit the city centre?



How did you travel last time you were in Oslo city centre?



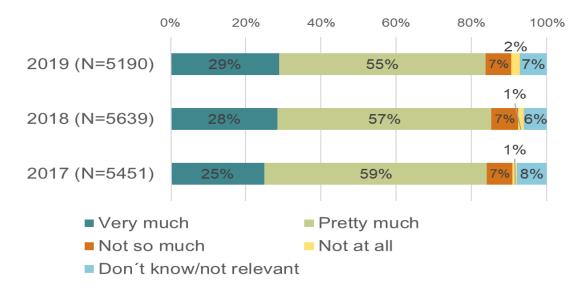
Hagen and Tennøy (2021)



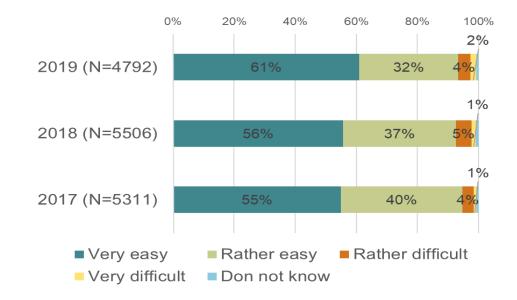
Effects and consequences

Leisure trips, except travels to/from work

How do you like visiting the city centre?



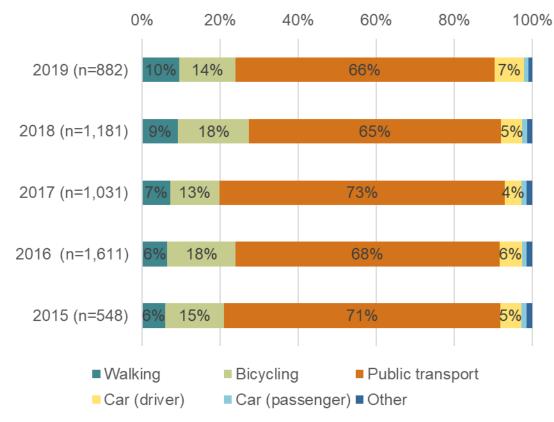
How easy is it to travel to Oslo city centre this time of the year?



Hagen and Tennøy (2021)



Commuters to the centre: Mode and commute satisfaction



Transport mode on commutes to the centre

0% 20% 40% 60% 80% 100% 10% 8%3% 2019 (n=882) 44% 13% 8%4% 2018 (n=1,181) 43% 45% 11% 8%2% 2017 (n=1,031) 11% 7%3% 2016 (n=1,611) 44% 8%3% 2015 (n=548) 28% 47% 14% Very satisfied Satisfied Neither nor Dissatisfied Very dissatisfied



Commute satisfaction



Reallocating on-street parking to bicycle lanes

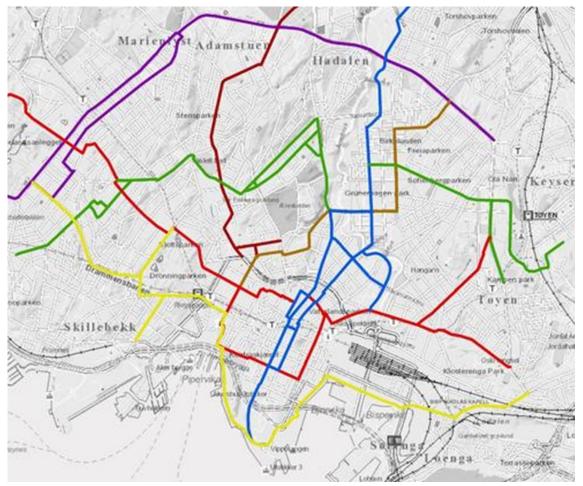




Illustration: Oslo municipality



Results, reallocation of road and street space

- Smestad tunnel: No adaptions, negligible effects, no consequences
- Bryn tunnel: Some adaptions, increased delays, no severe consequences
- Oslo City Centre: Almost no adaptions, effects or consequences (so far)
- Reallocating on street parking to bicycle lanes: Well-received (not surveyed)
- In all cases: Exaggerated fear of negative effects and consequences
- The City Government was re-elected, and has continued the work



Totality of changes

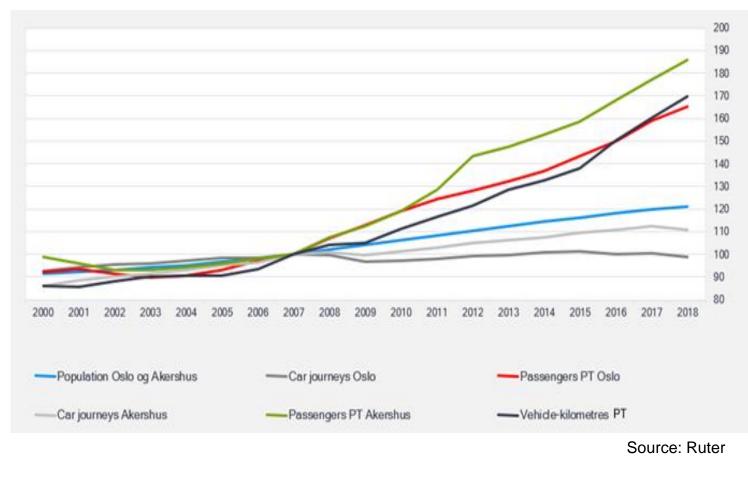
- Urban development (mostly) as densification within the city
- Reduced accessibility by car
- Improved accessibility by bike and by foot
- Improved public transport services
- Car-usage on commutes down from 21 to 16%
- Commute satisfaction stable and high, around 75% (very) satisfied





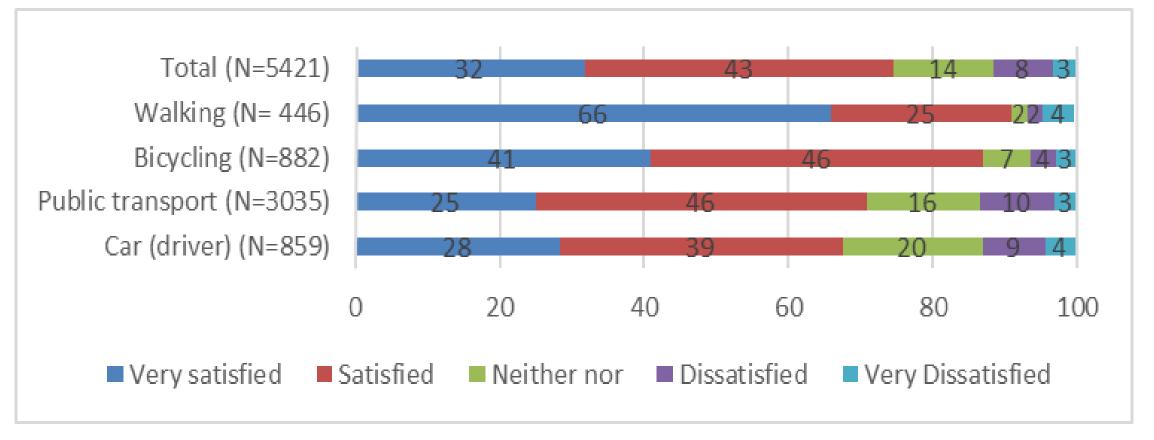
Oslo Urban Region – development since 2007

- Strong growth in PT services
- Strong growth in PT passenger
- Population growth
- Weaker growth in car trips (All is relative)



Happiest commuters by bike and by foot! Car-drivers also quite happy...

How satisfied are you with your commute at this time of the year? May 2019



Tennøy and Hagen (2020)





- Negative effects and consequences following reallocation of road, street and parking space to other uses were far less severe than expected and predicted
- The fear of 'chaos' and negative consequences was exaggerated
- This is in accordance with findings from other studies:
 - Other similar cases in Norway (Asplan Viak 2008, Torp and Eriksen 2009)
 - American cases (Brown et al. 2017, Taylor and Wachs 2014)
 - Similar cases (63) from all over the world (Cairns et al. 2002)





Reallocating urban road and street space to other uses caused fewer and less negative effects and consequences than anticipated, meaning:

- Reallocation of road, street and parking space to other uses are feasible alternatives
- Wider possibilities and more alternatives when planning for the future!
- Cities, centres and urban transport systems can easier be developed in ways contributing to reducing traffic volumes and making cities more efficient, liveable, enjoyable, healthy, walkable, bikeable....
- Less need for (and benefit of) expanding road space and road capacity
- Space, planning capacity, investments, etc. can be used in ways more effectively contributing to achieving societal goals



Important societal goals:

- Attractive cities good places to live and run businesses
- Vibrant cities city centre, people, social, lively, urbanity
- Just and inclusive cities accessibility, affordable housing
- Public health active transport, belonging, access to green
- Reducing land take bio-diversity, nature, farming, CO2
- Zero growth in road traffic volumes, CO2, energy, all above







E International Transport Forum



Reallocation of Road and Street Space in Oslo Measures for Zero Growth in Urban Traffic

Discussion Paper



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Reversing Car Dependency Summary and Conclusions

Ebach for spreads Urban main road capacity reduction: Adaptations, effects and consequences Aud Tennøy ', Oddrun Helen Hagen Instant of Transport Recommity, Department of Mubbley, Gaussadallien 22, 8349 Odo, Narway ARTICLEINFO ABSTRACT Keynerds: Read rapacity reduction Concensens Adaptation Effects Consequences Sumicable redulity To support matainable orbon mole other uses may be a relevant inteother uses agis to a nitrout intervention. Noted empirical knowledge could ender has highermoring and knowledge-enderstand, a planost, the same process proceedings of a some root in both. However, enzymat process shows a day, entered as enseting appendix planost and the same process of the same process structure and the same pro-tain a structure and the same process structures with construction. Experiments with a same constraints and the same process structures with constructions. Comparison to ensure material and an adjusters read-lating, addingence is not a same and the turned regular intervent dimension and the same process structures with constructions. Comparison in constru-tions and and the same process structures with comparisons comparison in constru-tions and the same process structures and the same adapted for samples mean structure and and the same process structures and the same adapted for samples mean structure and applicating. However, structures and the same adapted for the samples mean structure and and the same process structures and the same adapted for the samples mean structure and and the same process structures and the same adapted for the samples mean structure and and the same process structures and the same adapted for the same structure adapted for the same structure adapted for the same structure and the samplest mean structure and and the same structure and the same structure adapted for the same stru Increased time-usage or their commute, and some adapted by chenging monoport mode, a trip timing. However, results shased that they did not experience major negative common Few constraints reported a need to shift routines in the heavehold, and commune sait remained high. 1. Introduction Increasing plant tatlet elsens can applicate activat de sequencias, tatlet active, los of pathoma, protocom generations, patho bacha data data tatleta dana ganda plant tatleta increasiona de la constructiona de la construction mobility systems, where more of the transport is dones by (not, layc)ch, and public transport, and where the local and global publicas generated by the transport service strategies. The service base of the service service base of the service base of the service base of the service service base of the service base of the service base of the service service base of the service base of * Conseponding author. S-mail addresses: samplini.no (A. Tenney), addig tot.on (O.H. Hagen). https://doi.org/10.1016/j.md.2021.102948 Available online 6 May 2021 1261-0209/O 2021 The Authors. Published by Eleveler Ltd. This is an open access article under the CC BY license Available online at www.sciencedirect.com ELSEVIER Transportation Research ScienceDirect Procedia Transportation Research Proceedia 19 (2016) 4 - 17 International Scientific Conference on Mobility and Transport Transforming Urban Mobility mobil.TUM 2016, 6-7 June 2016, Munich, Germany

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Experiences with capacity reductions on urban main roads rethinking allocation of urban road capacity?

Aud Tennøy *, Paal B. Wangsness, Jørgen Aarhaug and Fredrik Alexander Gregersen Institute of Transport Economics, Gaustadalliev 21, 6367 Onlo, Norway

Abstract

This paper presents results from a study concerning efforts and consequences of a torperpay (one yes) capacity inclusion on a unione minima data taking body. Soveray, The men distribution are not inclusion of the cond acquiring from in taking and form to be larger in the Soveray The men distribution are not acquired to the study of the study

(http://erraitorecommons.org/icenses/by-nc-nd/4.02). Pter-review under responsibility of the organizing committee of mobil TUM 2016.

- Keywords: Reduction of urban road capacity; traffic volumes, delays, behavioraral adaption

1. Introduction

Ten tunnels on the urban main-road system in Oslo will undergo substantial rehabilitation in the period 2015 – 2020. These are dual tunnels, currying 20 – 27 000 cm as day. The works require doining down the tunnels, ep parts of them, and hence significantly rolation free ourd quearity for thetror of integer periods of time. We see this as natural experiments, offering great opportunities for researching effects and consequences of capacity reduction on urban highways, for the transport system as avel as for the users.

Corresponding author. Tel.: :47:900-38-220; fax: :47:22:00:92:00. E-mail address: atolictoi.no

2353-1465 O 2016 The Authon, Published by Elsevier R.V. This is an open access article under the CC BV/NC/ND lacense (http://transformansus.org/facense/by-ex-add/07). Peer-essive under responsibility of the organizing committee of mobil TUM 2016. (doi:10.1016/j.pmc.2016.12.06)

Transportation Research Part D 97 (2021) 102944 I Proprieta de la Contents lists available at Scient 5 Transportation Research Part D inumal homeneges Creat for Anticipe Street-space reallocation in the Oslo city center: Adaptations, effects, and consequences

Oddrun Helen Hagen ", Aud Tennøy

Institute of Transport Recomment, Department of Mobility, Gaussadedism 33, 6349 Oalo, Norwej

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	expand authorities' understanding of feasible interventions when developing more sustainable and people-driendly cities.

1. Introduction

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* Corresponding rather. E-mail addresses which into (O.H. Hagen), and int as (A. Tenney).

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Effects of urban road capacity expansion - Experiences from two ۲ Norwegian cases

Aud Tennøy*, Anders Tønnesen, Frants Gundersen Institute of Transport Economics - Norwegian Center for Transport Research, Gaussadalleen 21, 4049 Oulo, Norweg _____

ARTICLE INFO ABSTRACT A STIRAT Keywords: Road capacity exponsion Land-use effects Induced traffic Congestion Utban areas Planning

covertinuing to stop traffic growth, in accordance with national policies. Meanwhile, total au-thorities plan for new capacity expansions in the investigated corridors. Land use effects of the capacity expansions neem, again, not to be included in the assessments.

1. Introduction

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¹ Corresponding author. E-mail address: ateiltoi.co (A. Tennev).

https://doi.org/10.1016/1.trd.2019.01.02 Available online 05 February 2019 1301-2020/ © 2019 The Authors, Published by Elsevier Ed., This is an open access atticle under the CC BY-NC-ND license (http://creativecommon.org/licenses/WY-NC-ND/4.0/).



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The recipe for achieving all the goals

- Land use development as central densification and transformation rather than sprawl
- Strengthening city centres
- Improving conditions for walking and bicycling
- Improving public transport services
- Restrictions on/ not facilitating for car-usage





Truck drivers (Bryn)

Adaptation:

Drove mainly as before Some changed route, and some trip-timing

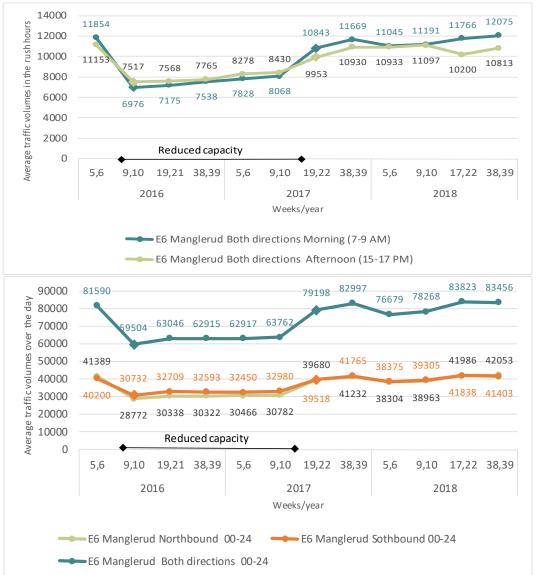
Effects:

Increased congestion (16%) Increased time-usage (14%)

Consequences:

More stress and frustration (15%) More inconvenient work hours (13%) More unpredictable work-days (10%)

Bryn tunnel



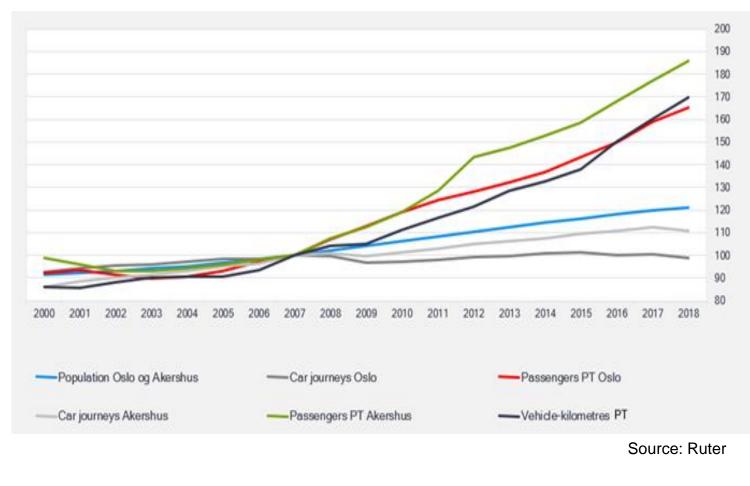
Average speed, rush hours



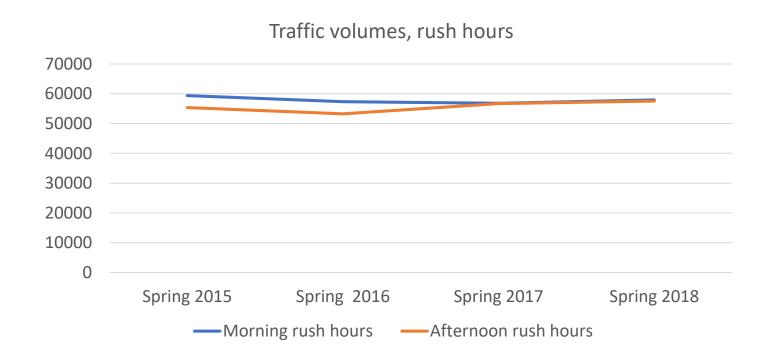


Oslo Urban Region – development since 2007

- Strong growth in PT services
- Strong growth in PT passenger
- Population growth
- Weaker growth in car trips (All is relative)

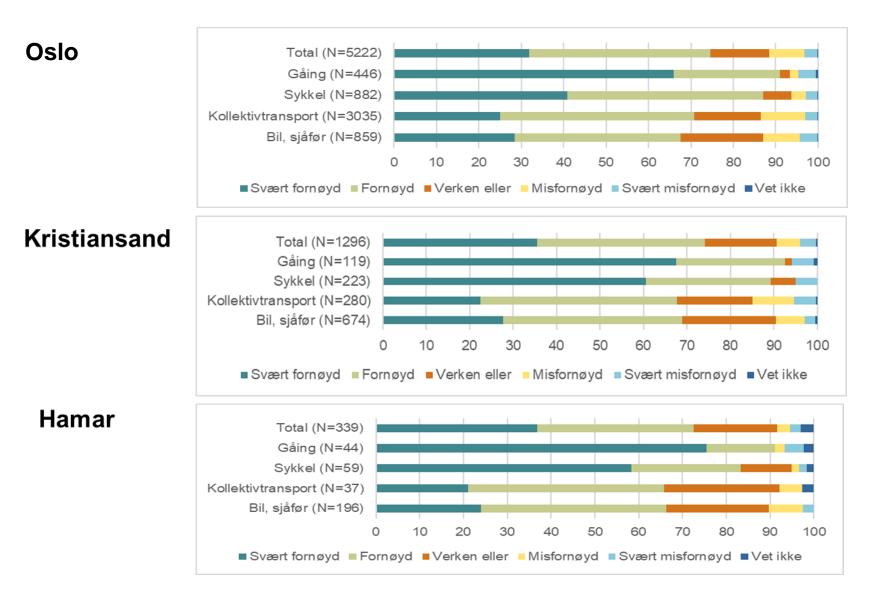


Traffic, total of five registration points





Same also in smaller cities





Urban Growth Agreements (NTP) Key tools for achieving Zero-growth

- Binding agreements between national, regional and municipal authorities on how to develop land-use and transport systems towards zero-growth
- Regions: Suggesting and analysing alternatives, decisions made politically
- Funding: Toll rings, ordinary budgets, state grants 66% of investments for large infrastructure projects, PT and roads
- Different options, decided by and for each urban region:

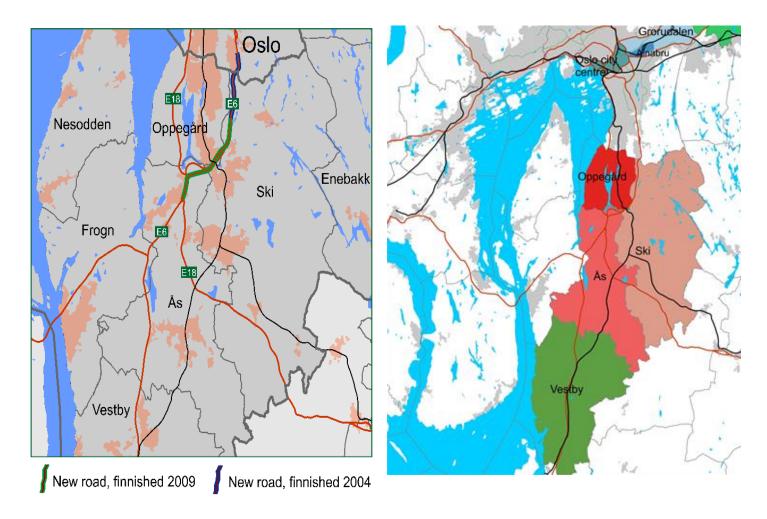
Source: Norwegian Public Roads Administration





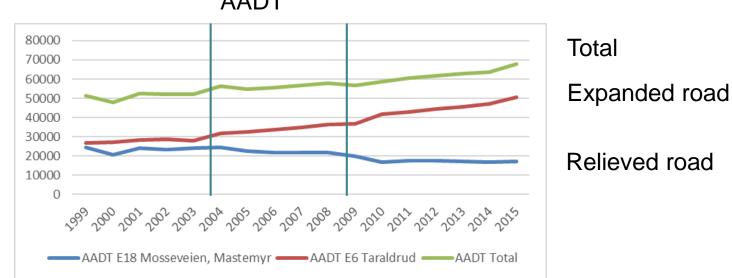
Example Increased road capacity E6 from Oslo, southbound

- Expanding E6 from 2 to 4/5 lanes (completed 2009)
- Main road crossing Oslo border in south, connecting Oslo with outer urban areas, south-eastern parts of Norway and Sweden
- AADT (2015) 50 000 vehicles per day
- Oslo metropolitan area: about 1 000 000 inhabitants



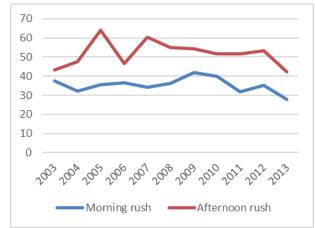


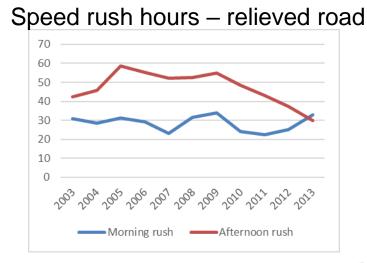
Result: Increased traffic, no congestion reduction



AADT

Speed rush hours - expanded road

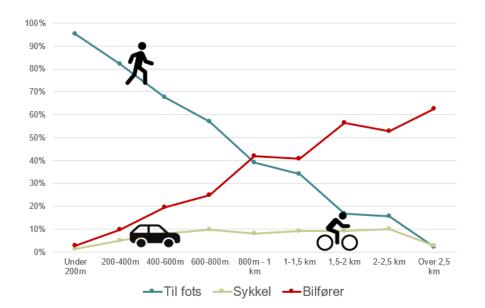




Norwegian Centre for Transport Research

Tennøy et al. (2019)

Improving conditions for walking and cycling

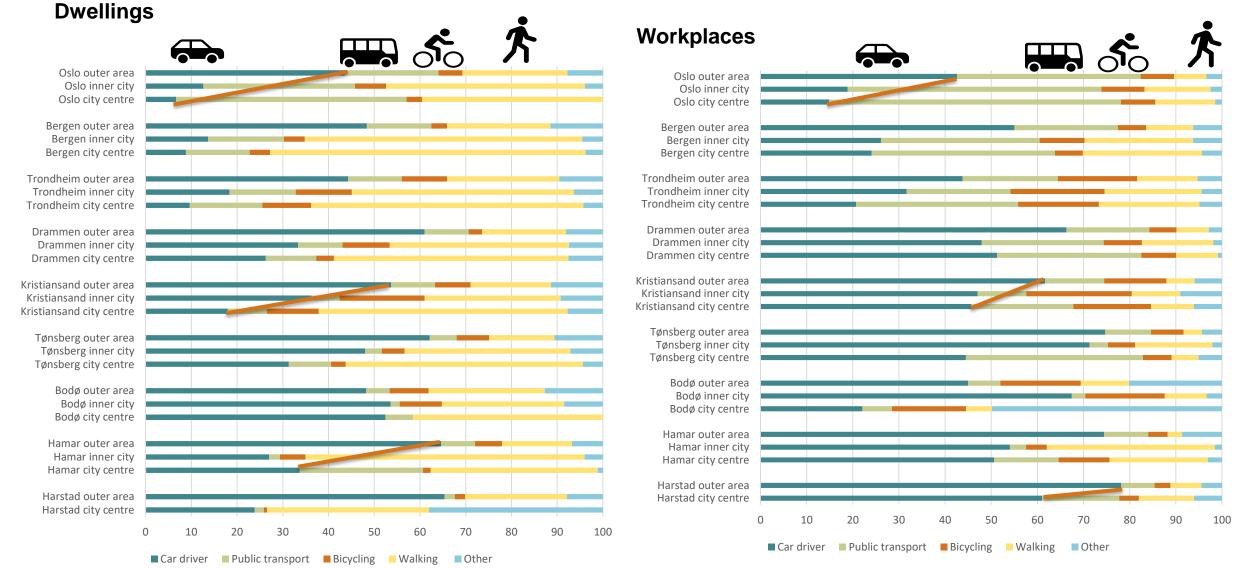




- Land use short distances
- Safe, comfortable, interesting
- Separate pedestrians and cyclists
- Bicycle infrastructure
- Walkability
 - Build streets not roads
- Down- prioritization of car traffic
 - Speed, parking, etc.
- Holistic and long terms strategies
 (Pucher et al., 2010; Forsyth og Krizek, 2010)



Localization in urban structure affects modal choice

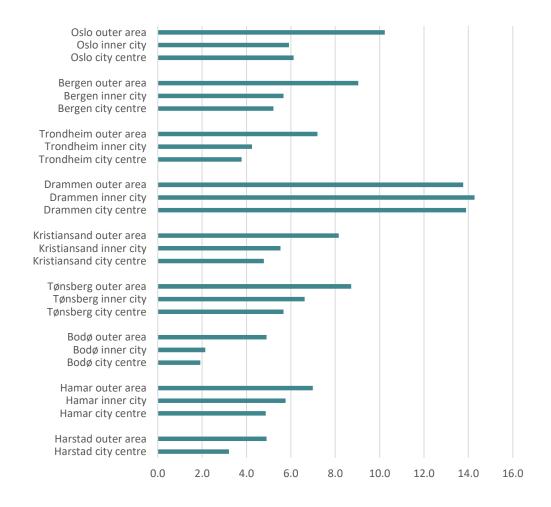


Tennøy et al. (2021; 2022), based on NTS 2013/14 og 17/18

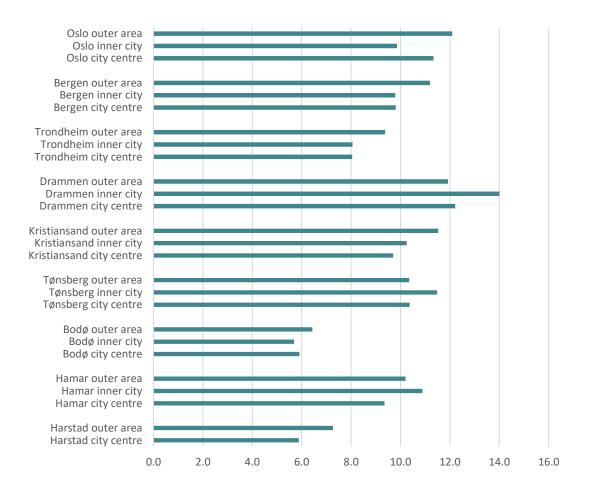


Commuting distances increase with distance to city centre

To/from dwellings



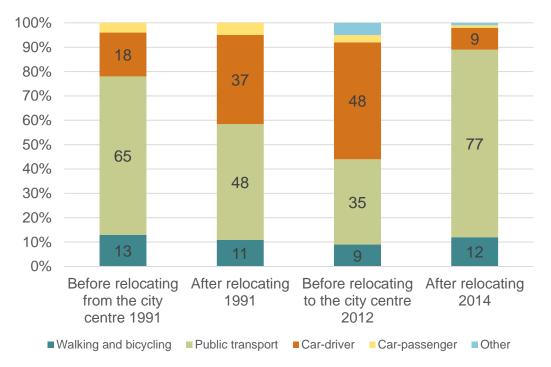
To/from workplaces





When work-places relocate

Oslo – insurance company relocating first from the city centre, and then back



Christiansen and Julsrud (2014)







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