Transport effects and environmental consequences of central workplace location

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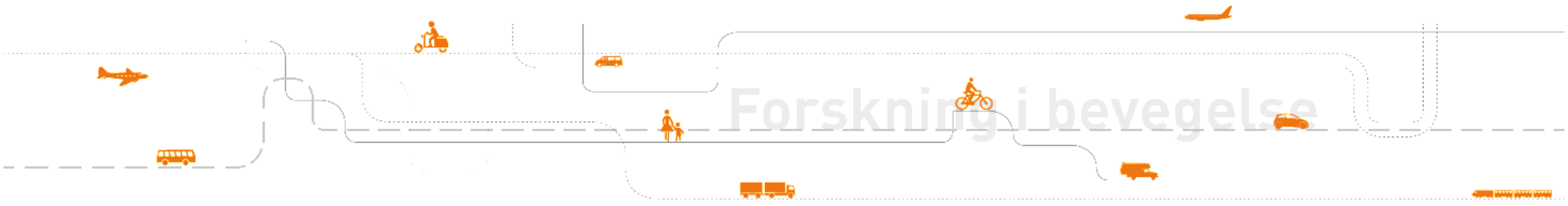


Background and research question

- Commissioned work for Rom Property - developing the National Railway's properties in Norwegian cities
- Needed a sound knowledge base for developing their strategy
- Literature review
- Calculation of one case (Bjørvika)

- **Research question**: What are the transport effects and environmental consequences of constructing 12 500 new workplaces in Bjørvika rather than locating them as the current distribution of workplaces in the Municipality of Oslo?

Case Bjørvika

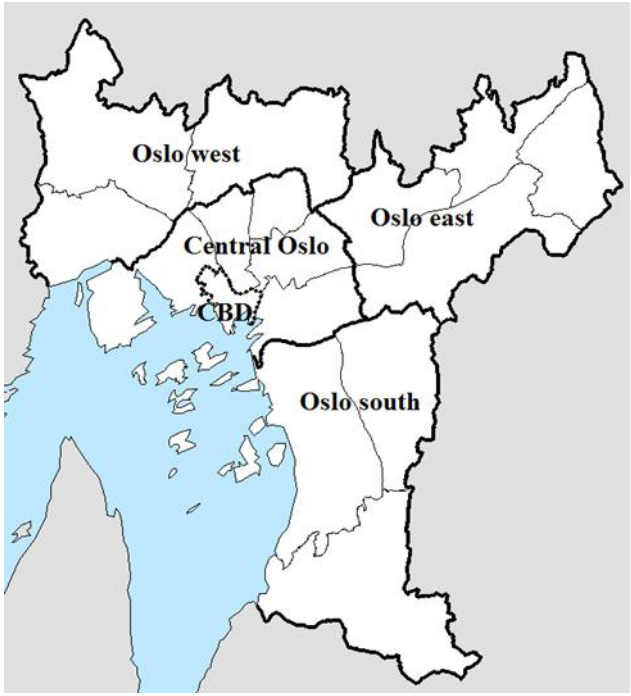
- Subsea tunnel replace major road
- Giving room for construction of Barcode:
  - 70 hectares
  - 15 – 20 000 workplaces
  - 5 000 apartments
- Also: The Opera, museums, city library etc.
- Parking for 4 % of the employees

Theoretical understanding

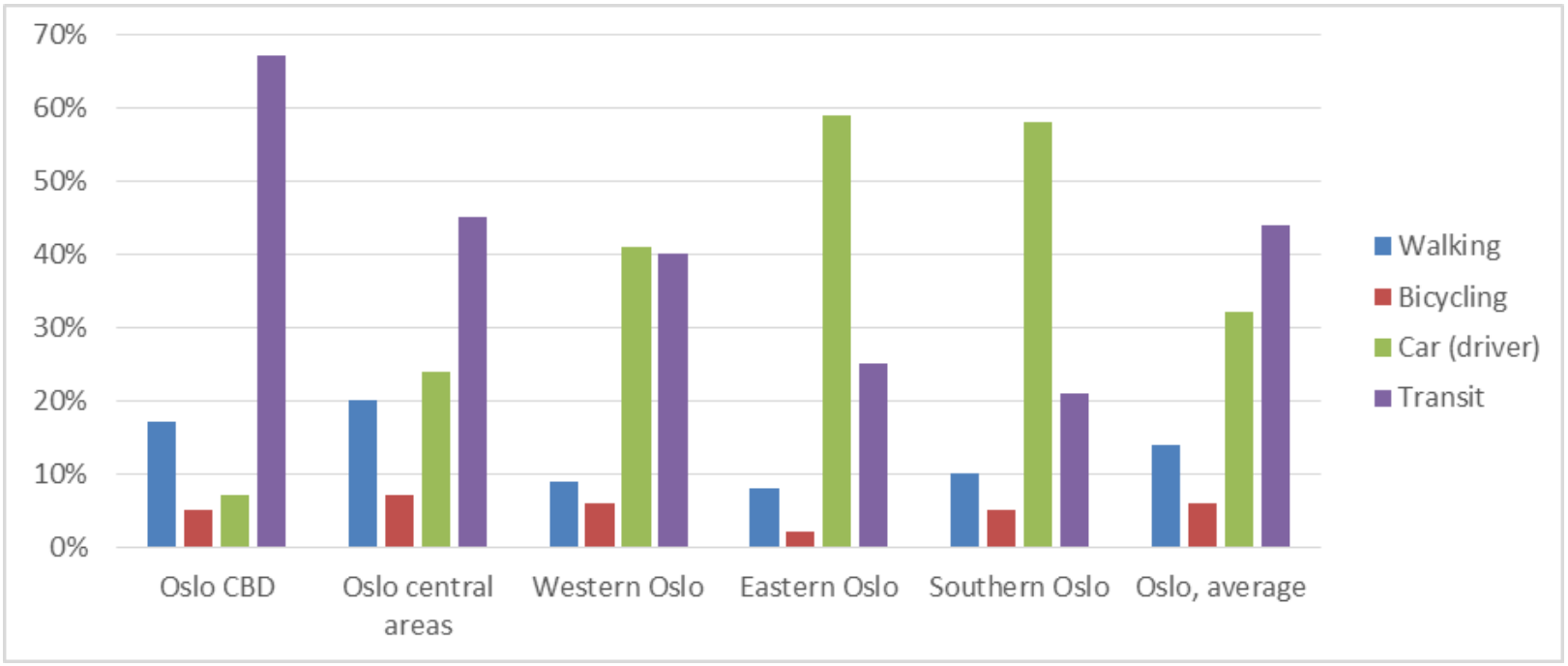
- Workplaces in the city centre are expected to generate less traffic volumes (vkm) and more public transport (pkm) than workplaces located elsewhere, because centrally located workplaces:
  - Have best public transport accessibility from city and region
  - Have most people living in walking- and bicycling distance
  - Have worst conditions for car-usage (congestions, delays, parking access)
- This is a common understanding, but there are rather few empirical studies on this

Method and data

- Using data from the National Travel Survey (2009)
- For the city centre and for Oslo average, calculating:
  - Modal splits
  - Average travel length per mode per person using that mode
- Calculating traffic volumes (vkm) and public transport (pkm) travelled averagely *per employee* per day
- Calculating environmental consequences of locating 12 500 workplaces in Bjørvika (centre) and Oslo (average), comparison



Modal splits on travels to work



Average travel lengths per mode

Average length of trips	N=	Oslo city centre	Oslo, average
All modes (km per day)	1 069	19.5	23.4
Car drivers (km per day)	386	67.1	42.9
Public transport users (km per day)	450	22.2	16.7

N=14 for car drivers to work in the city centre, hence this figure is uncertain

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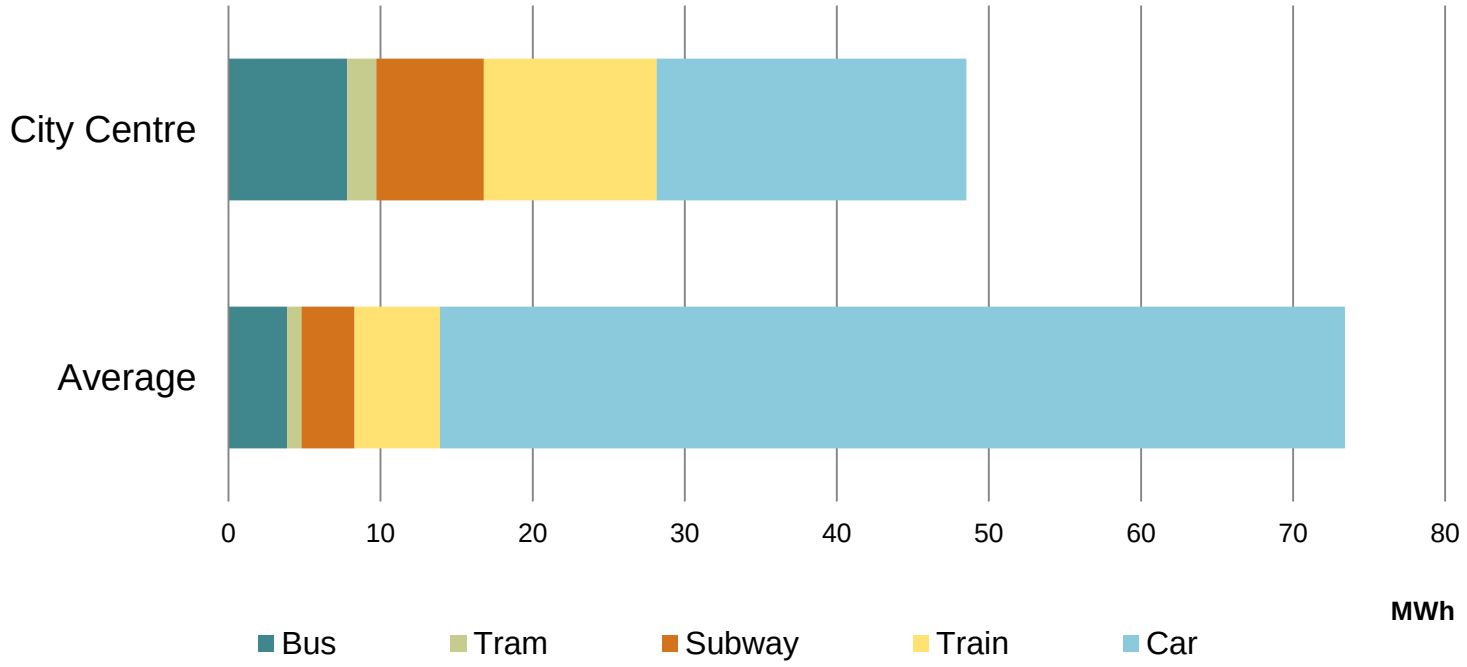
Travel distance per day per workplace per mode

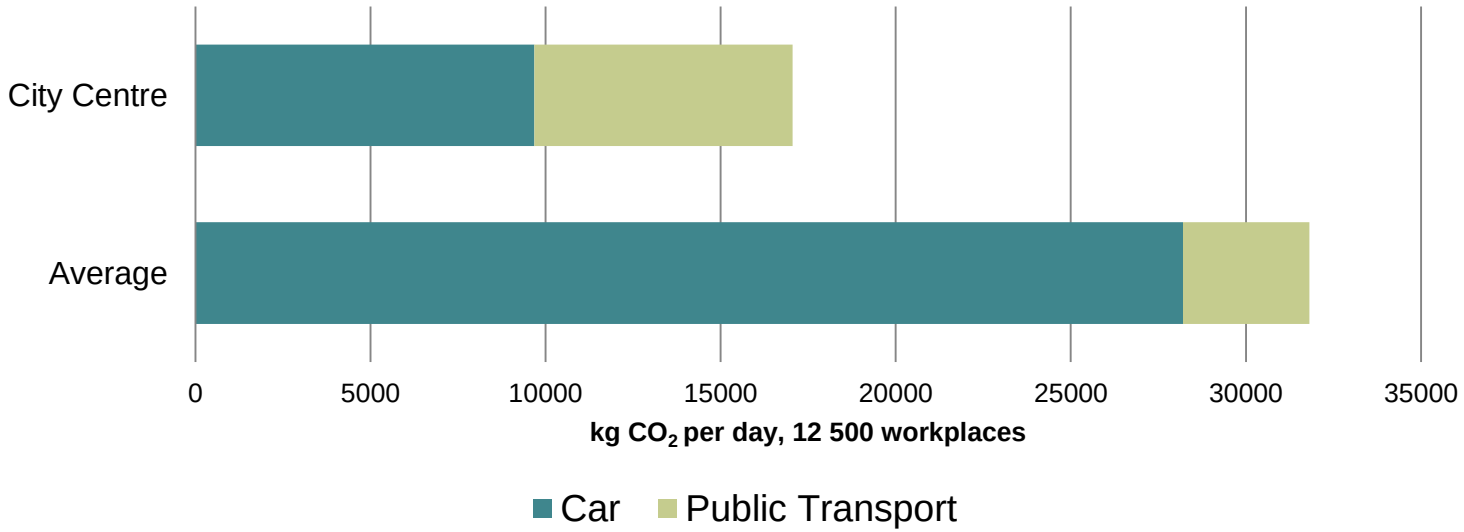
Average length of trips	N=	Oslo city centre	Oslo, average
Per workplace (car vkm)	386	4.7	13.7
Per workplace (public transport pkm)	450	14.9	7.3

Environmental effects og locating 12 500 new workplaces in Bjørvika instead of elsewhere

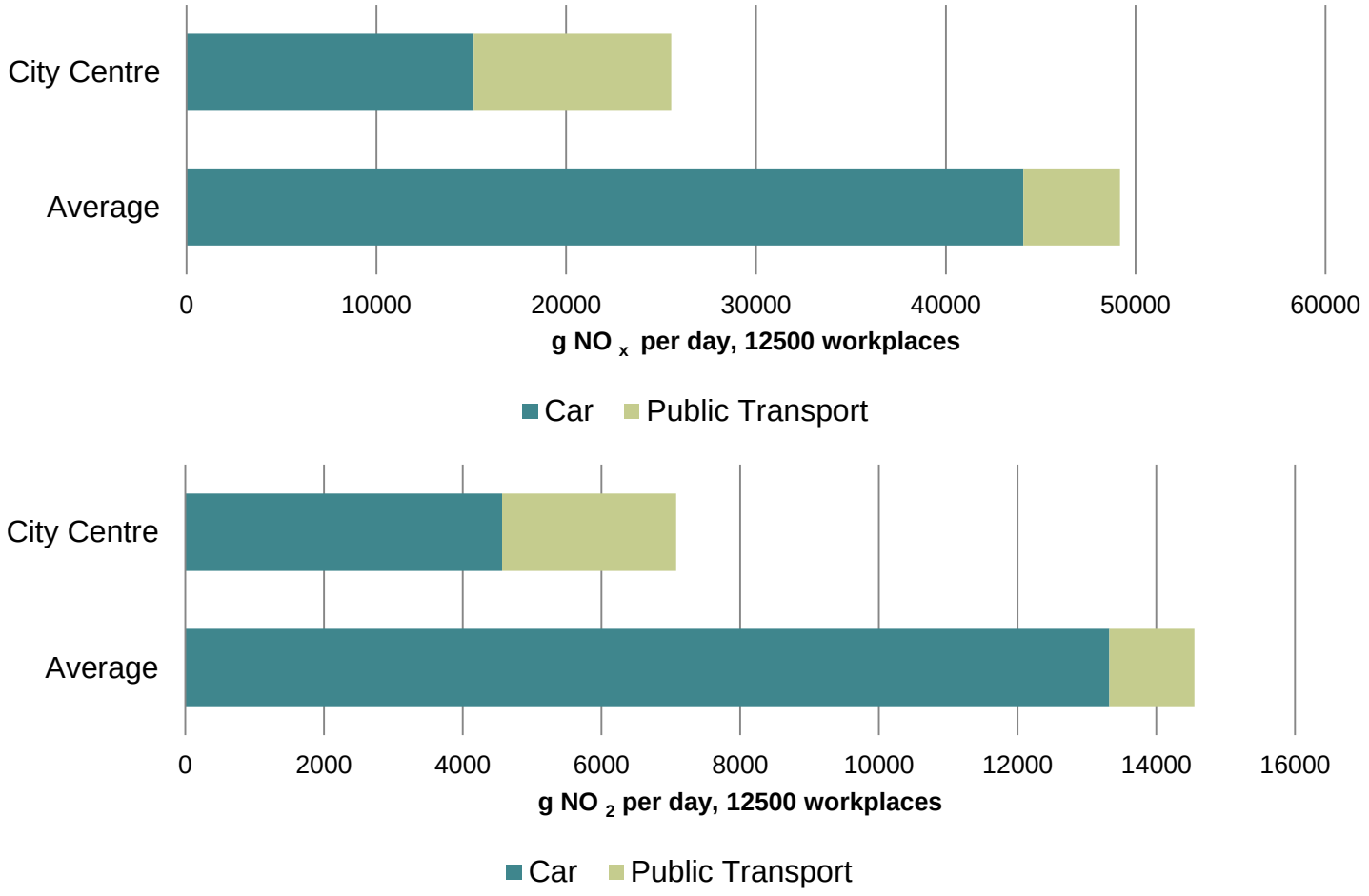
- 35 % less energy for transport



Half as much CO2-emissions



Half as much NOX and NO2 emissions



Benefits – 12 500 workplaces

Saved	Per day	Per year (230 work days)
Car trips	6 250	1.4 million
Traffic volumes (vkm)	110000	25 million
CO_2	15 tonnes	3 500 tonnes
NO_X	23 kg	5 tonnes
NO_2	8 kg	1.8 tonnes
Energy use	25 MWh	6 GWh

Conclusions

- Centrally located workplaces do generate less traffic and environmental consequences caused by traffic than workplaces located elsewhere
- Our findings are in accordance with previous studies
- If reducing traffic volumes and environmental consequences are important objectives, new area-intensive workplaces should be built in central areas
- High densities should be allowed in central parts of cities, where car-usage is low

Relevance

- Produced a knowledge base for Rom Property AS
- Could also be useful knowledge for similar debates elsewhere
- Contributing to the scientific knowledge base

Further research

- Similar studies in smaller cities
- Similar studies in lower order centres
- Similar studies for housing and retail
- Similar studies, while distinguishing different kinds of workplaces (area-intensive, area extensive, highly specialised, less specialised, etc.)
- Before- and after studies when businesses relocate to such locations
- Include socio-economic analyses of caracteristica of the employees

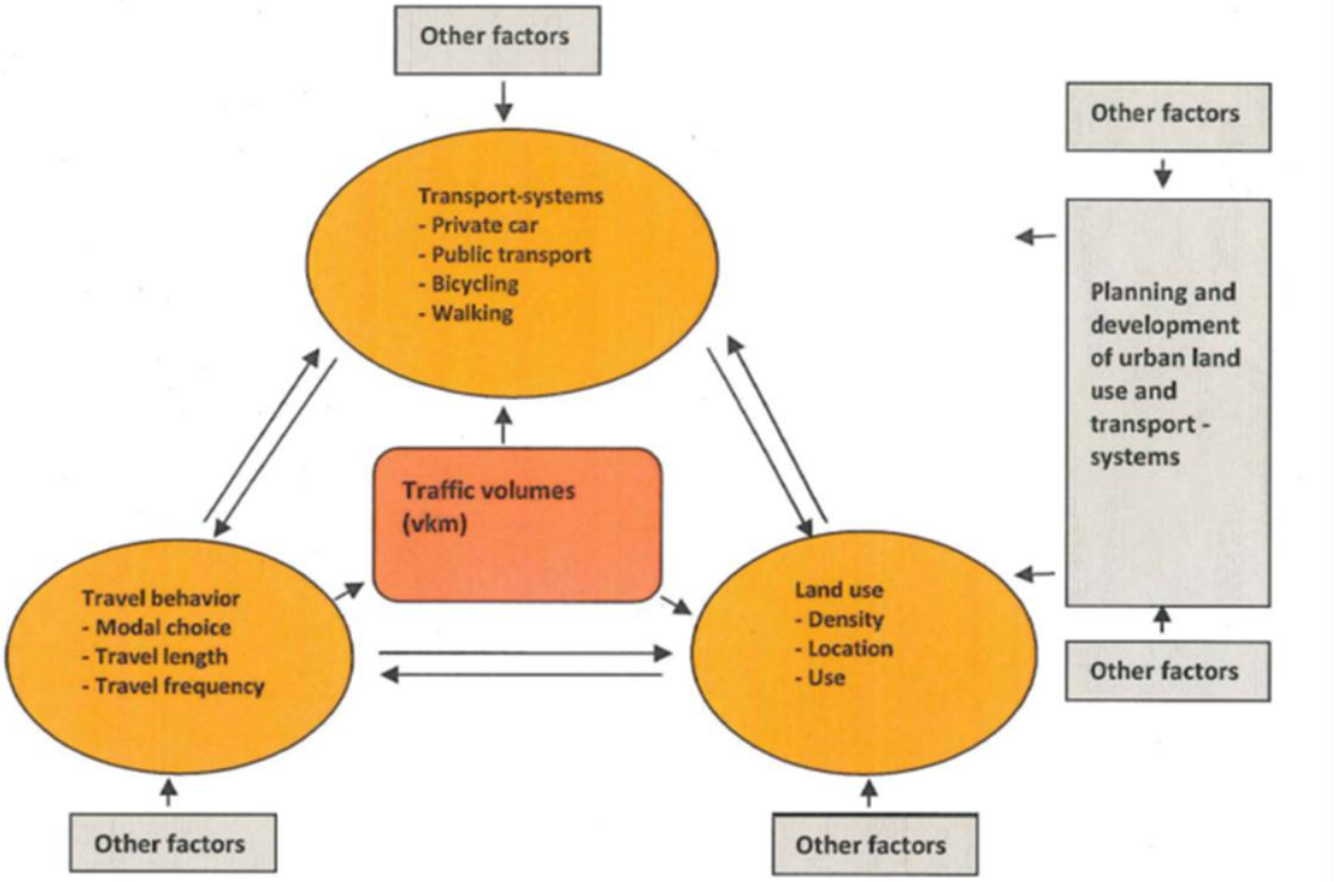
Thank you!

Transportøkonomisk institutt
Stiftelsen Norsk senter for samferdselsforskning

- *Vkm per employee $_{Zone\ i}$ = Car share $_{Zone\ i}$ x Average travel length for those commuting by car $_{Zone\ i}$*

- *Pkm per employee $_{Zone\ i}$ = Public transport share $_{Zone\ i}$ x Average travel length for those commuting by public transport $_{Zone\ i}$*

Interrelations



Interrelations

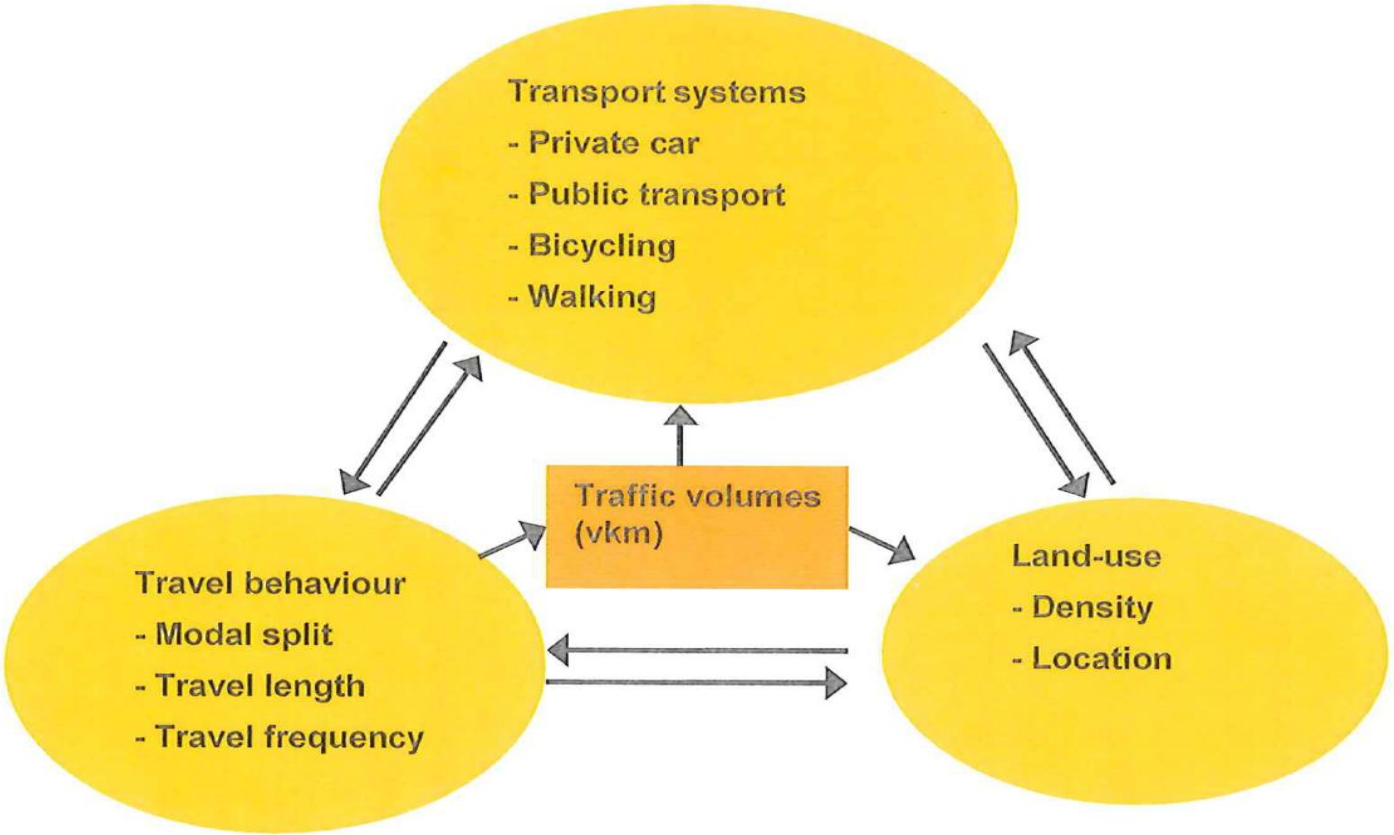
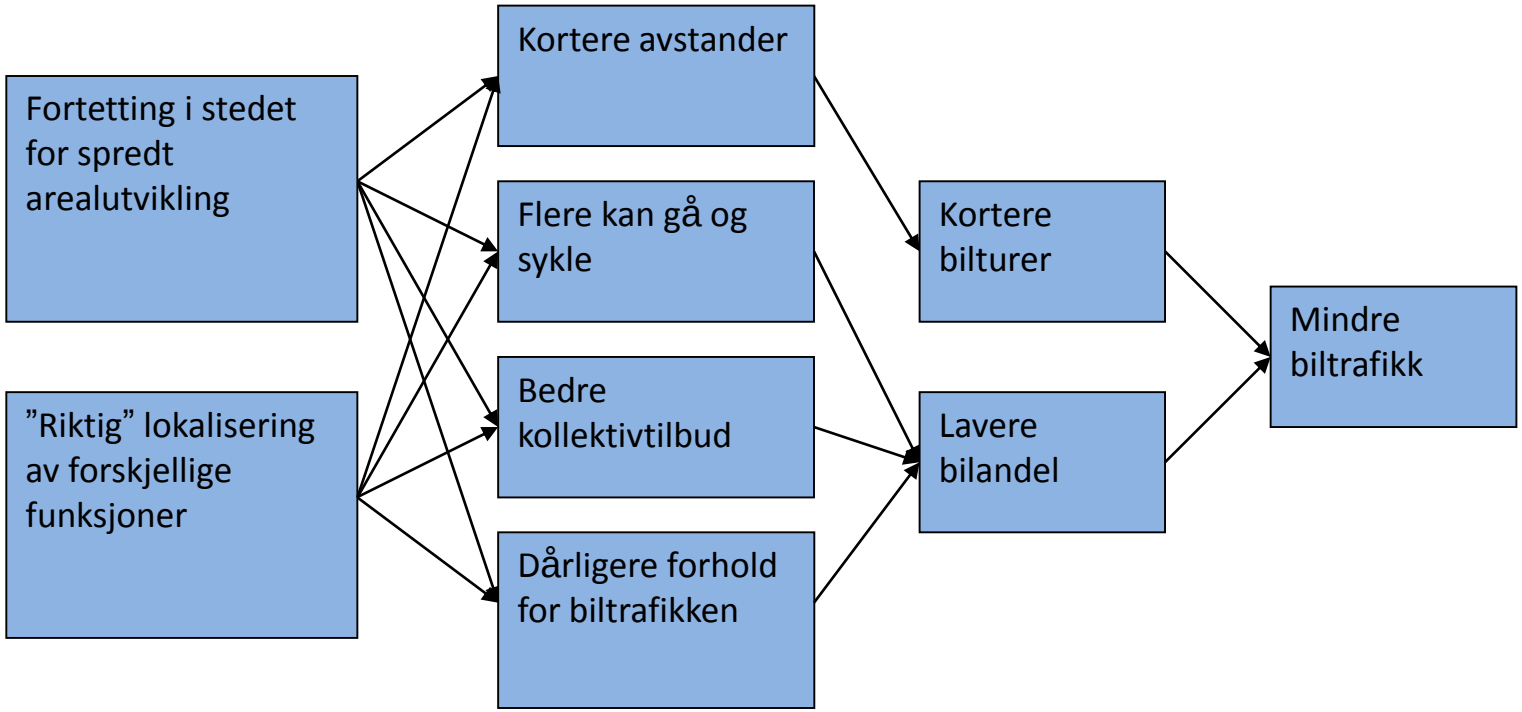


Figure 2: Development of land-use, transport systems, travel behaviour and road traffic volumes are interconnected in dynamic and complex, but logical, feedback relations (Tennøy 2009).

Tennøy (2009)

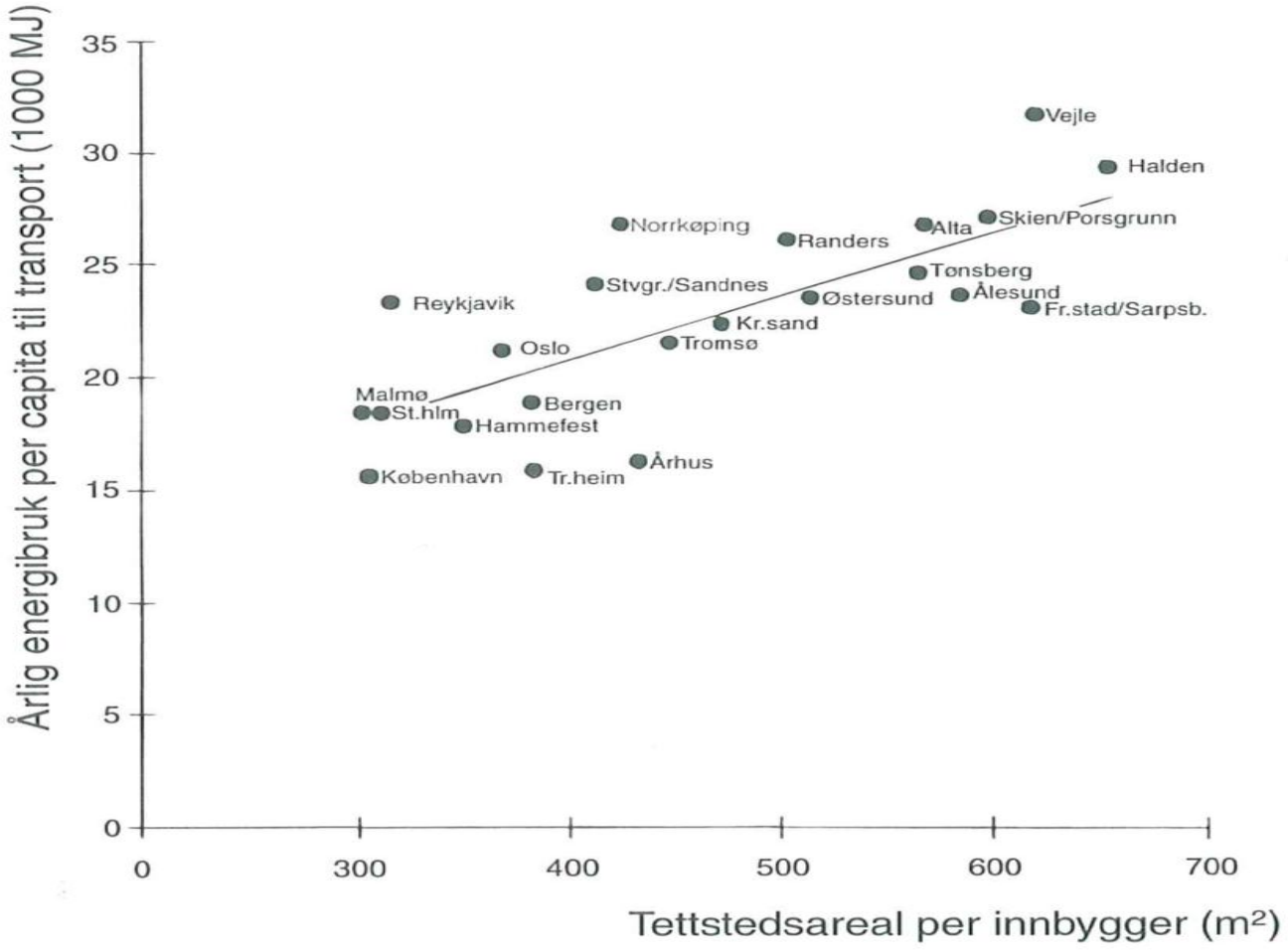
Arealstruktur - trafikkmengder

Arealutviklingen definerer rammebetingelsene for reiseatferd – muligheter og preferanser med tanke på hvor man reiser, hvor ofte og med hvilke transportmidler



Tennøy (2009)

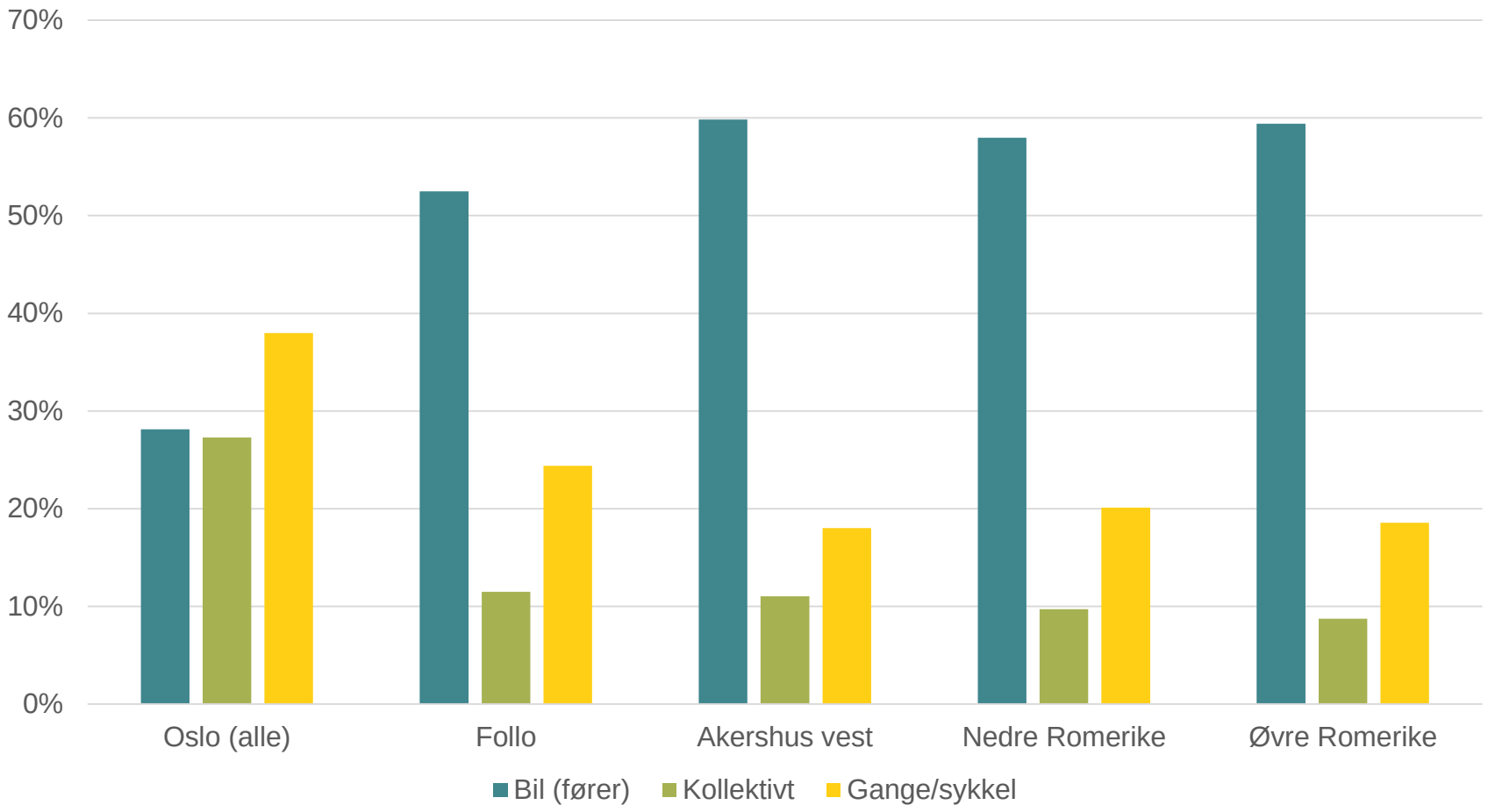
Bygg byene tettere



Dobbelt så mye energi per person til transport i Halden som i København

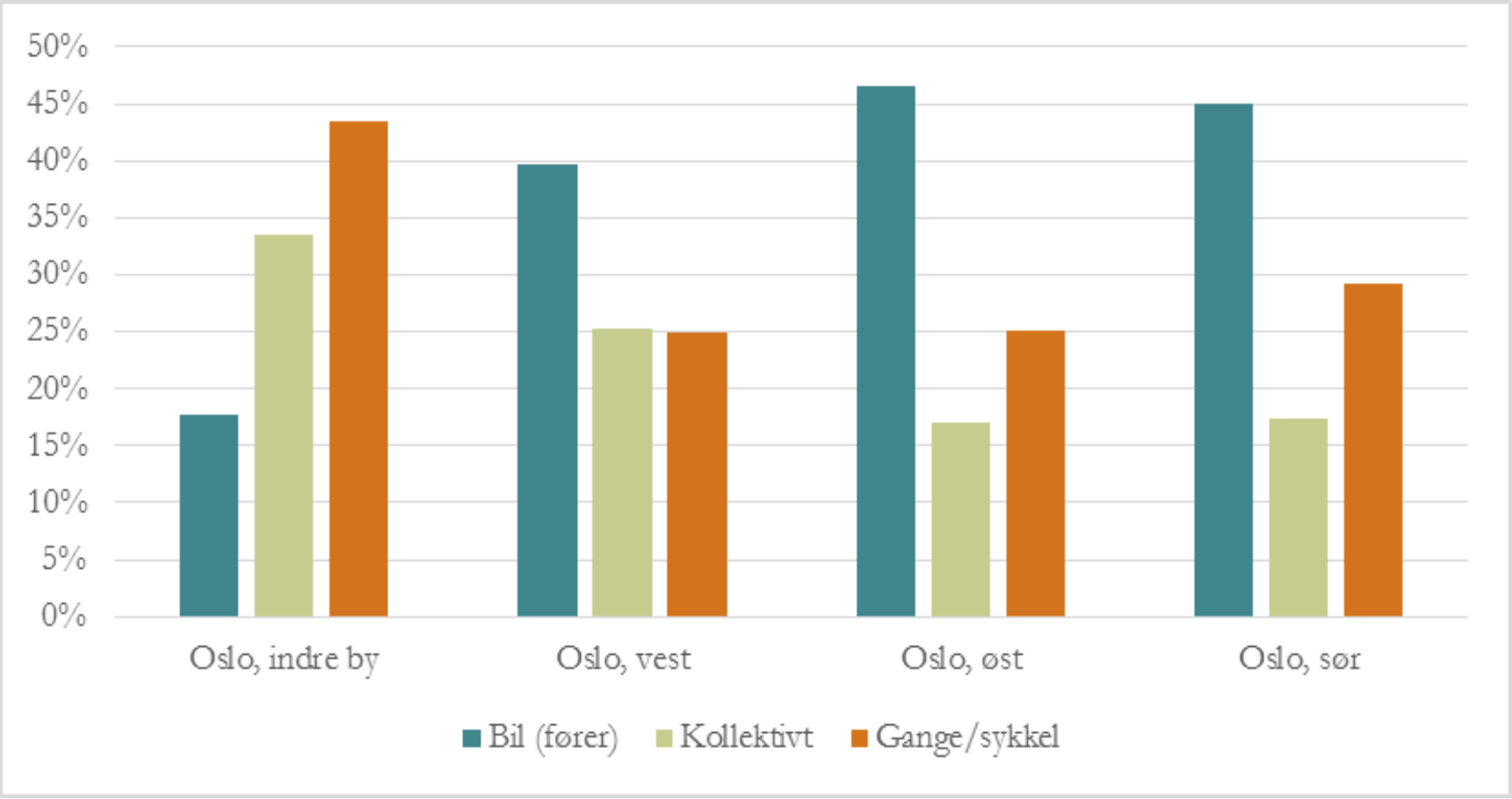
Sammenhenger mellom tetthet og energiforbruk til transport i nordiske byer (Næss 1997).

Bygg sentralt



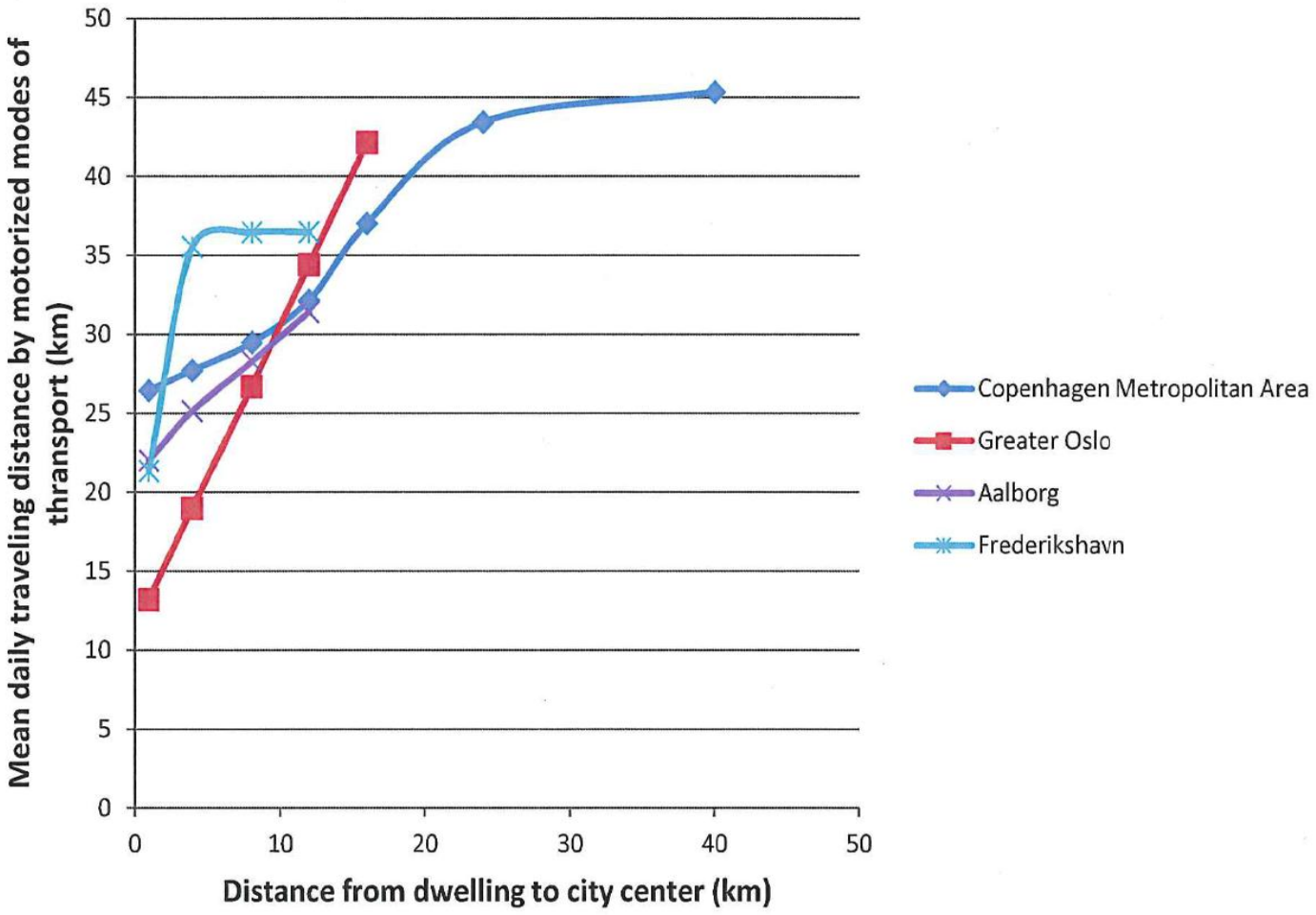
Tennøy mfl. 2013

Også internt i byen



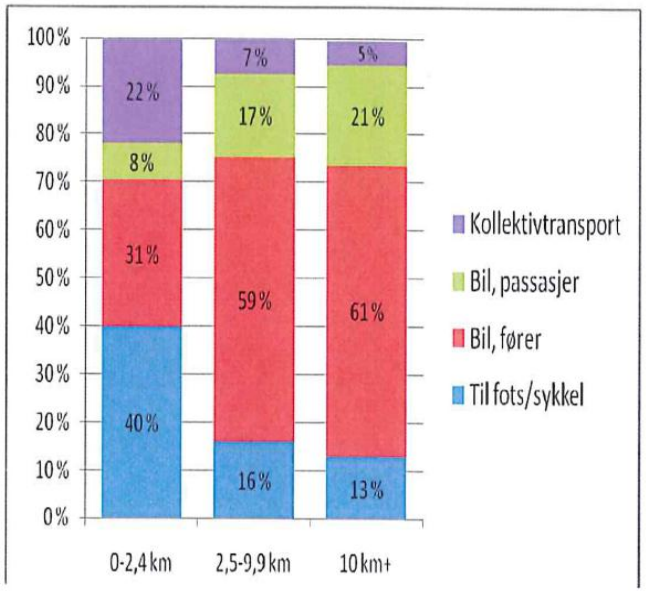
Tennøy mfl. 2013

Sentrale boliger gir minst bilbruk

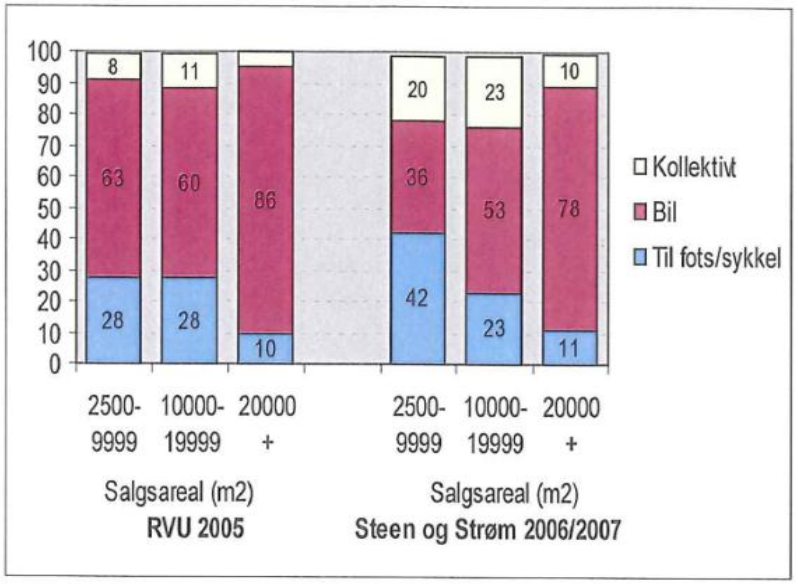


Næss, 2012

Små og sentrale kjøpesentre gir minst biltrafikk



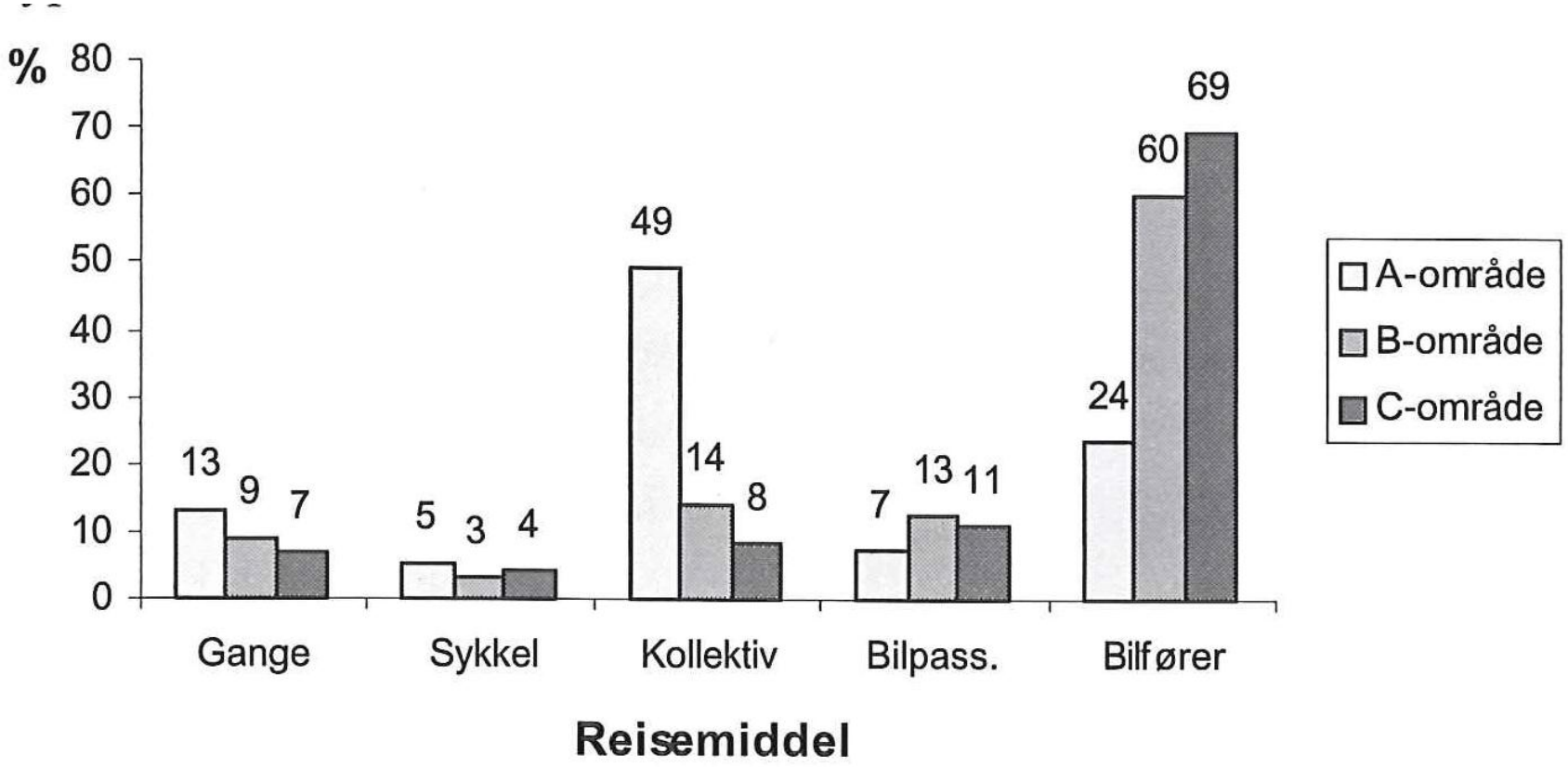
Figur 3-29: Reisemåte på handlereiser til kjøpesentre etter senterets avstand fra sentrum. Kjøpesentre lokalisert i eller rett utenfor tettsteder med minst 50 000 innbyggere. Prosent. Datagrunnlag: RVU 2005.



Figur 3-26: Reisemåte på handlereiser til kjøpesentre etter kjøpesentrenes salgsareal (m^2). Prosent. Kilde: RVU 2005 og Steen og Strøms kundeundersøkelse 2006 og 2007.

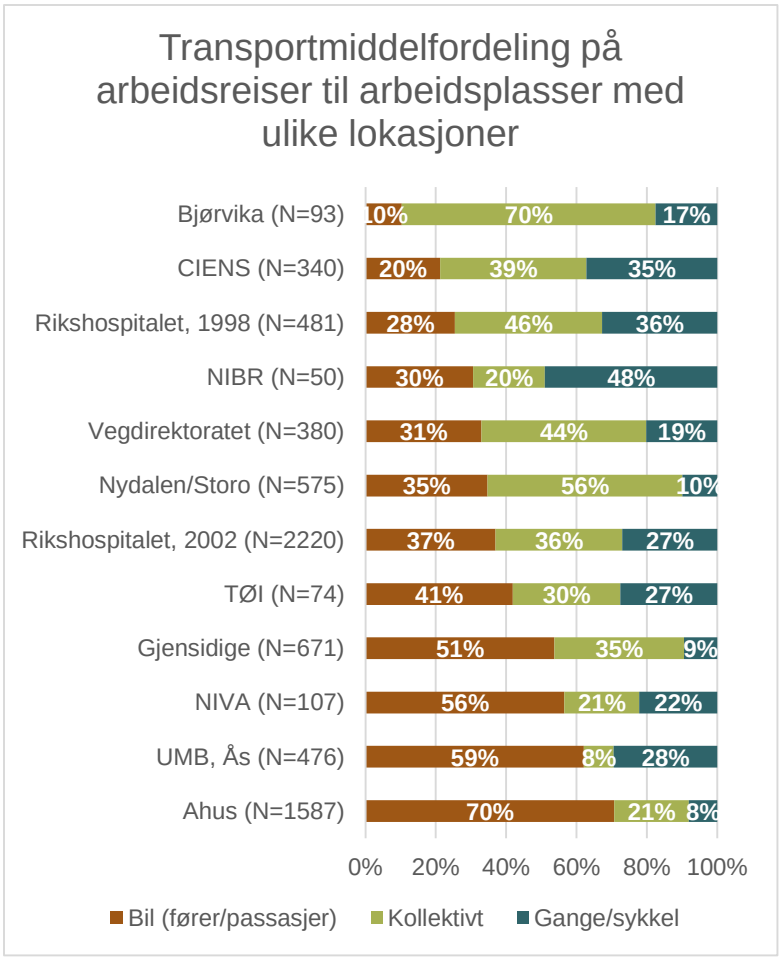
Engebretsen, Hanssen og Strand (2010)

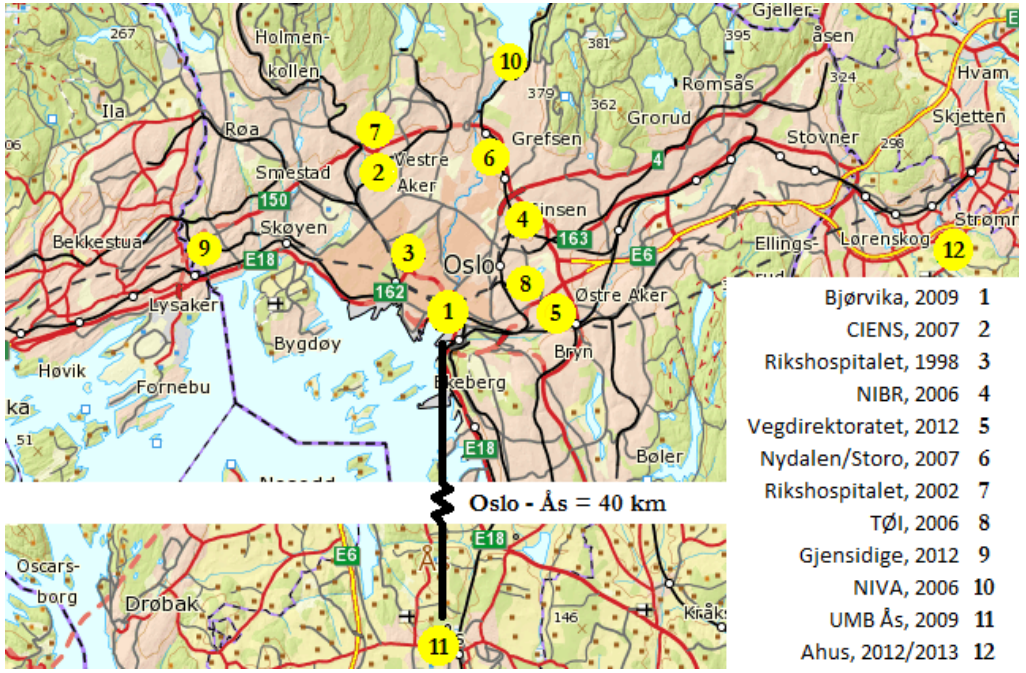
Minst biltrafikk til sentrale arbeidsplasser - Trondheim



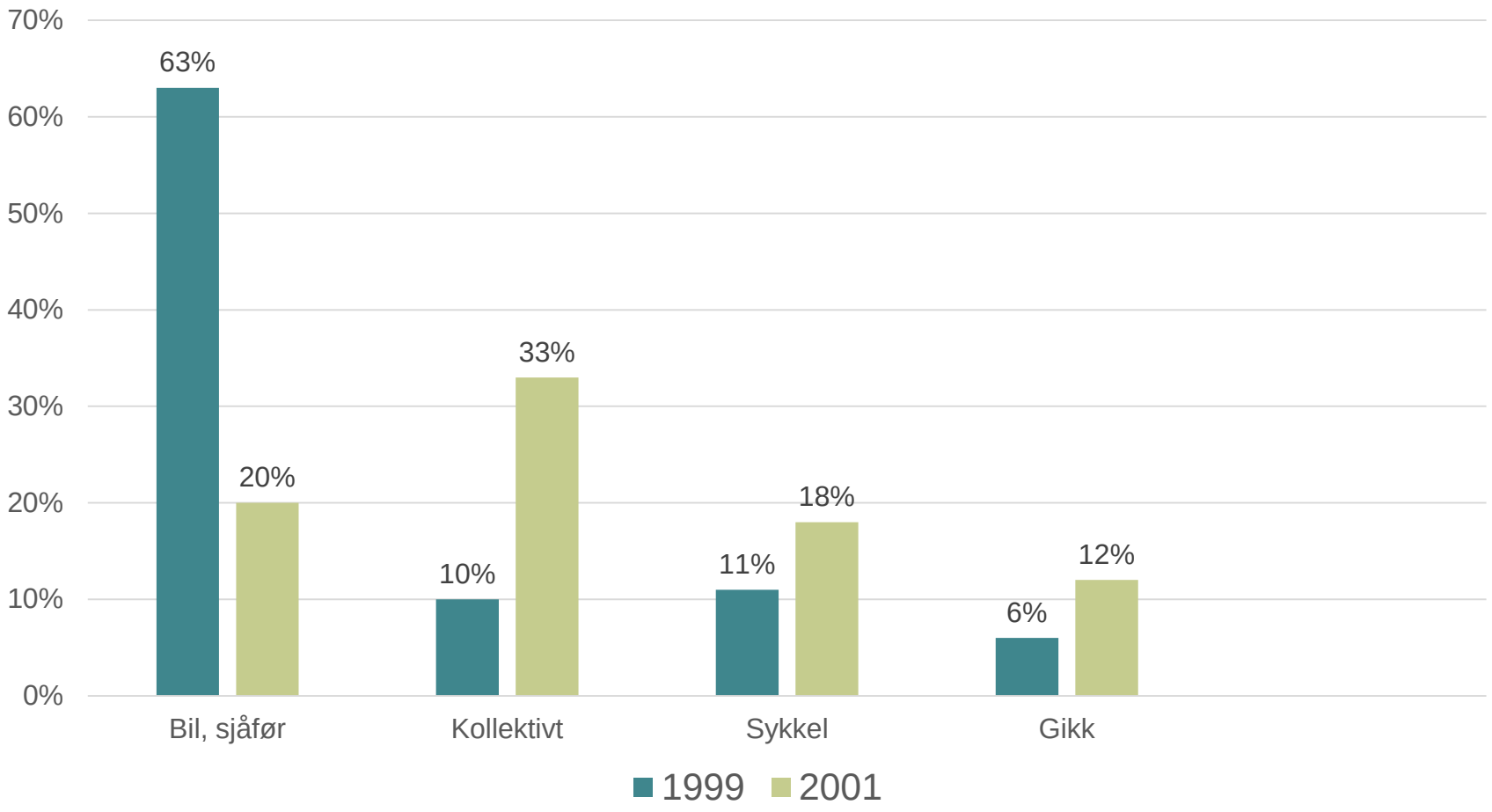
Reisemiddelfordeling på arbeidsreiser blant ansatte i ulike områder i Trondheim (Strømmen 2001)

Arbeidsreiser til arbeidsplasser i Oslo



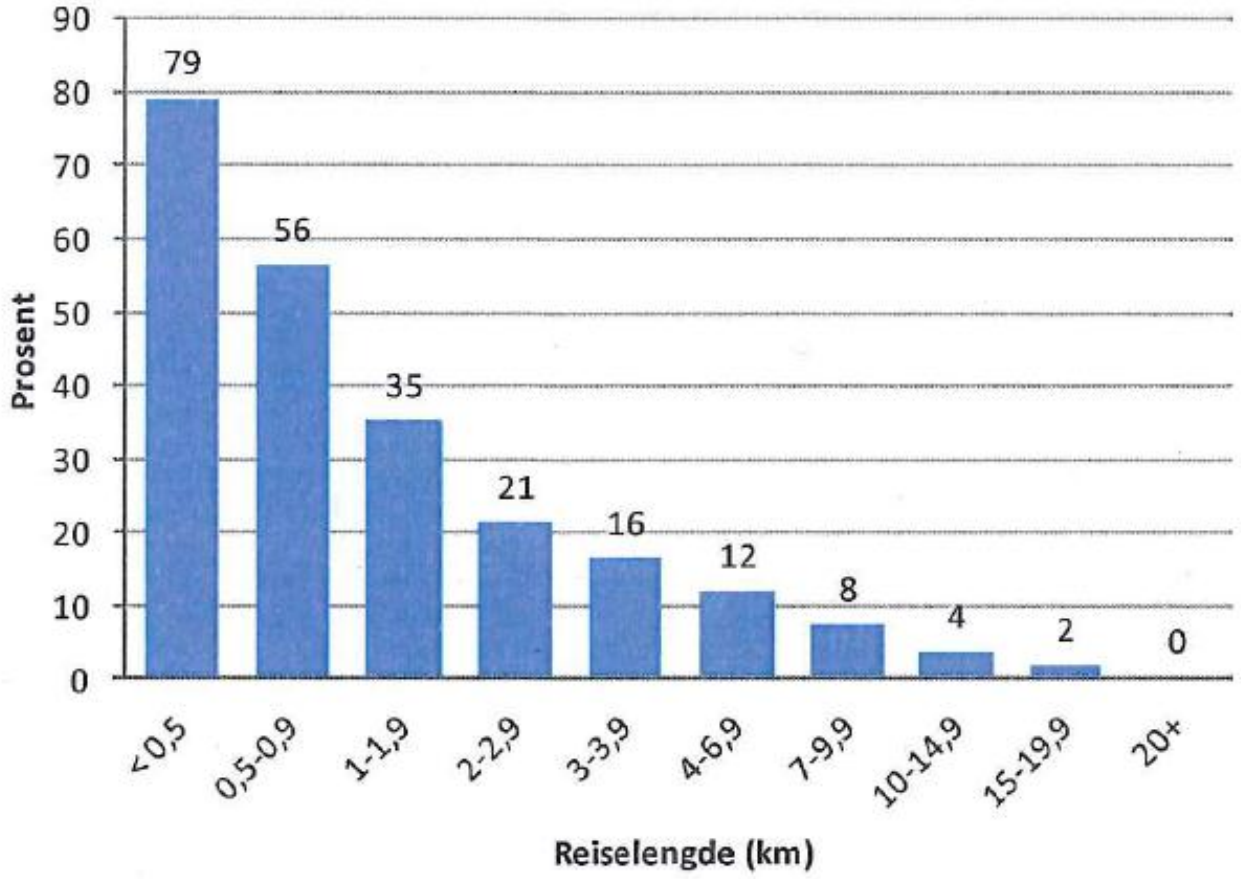


Flytting til Statens hus i Trondheim 2000



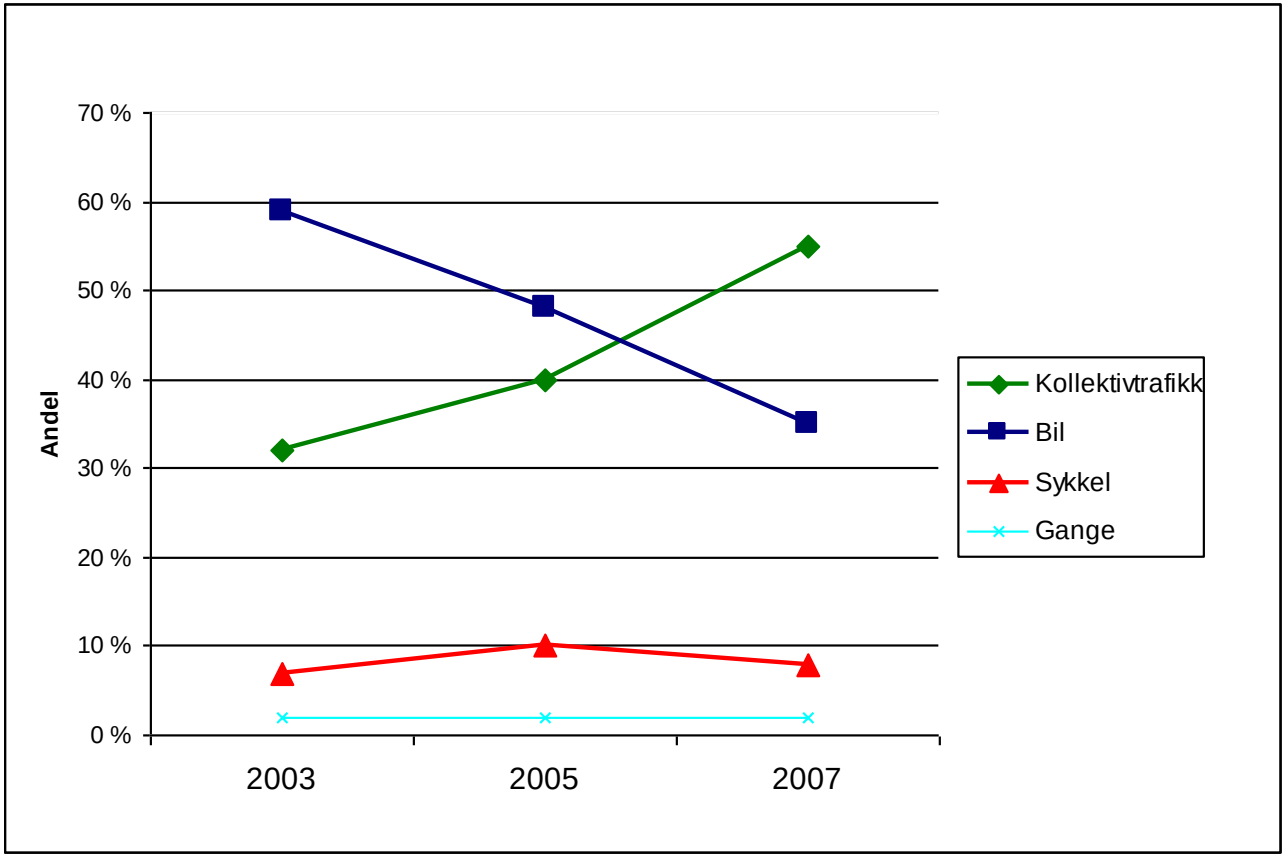
Meland, 2002

Korte avstander må til for at folk skal gå



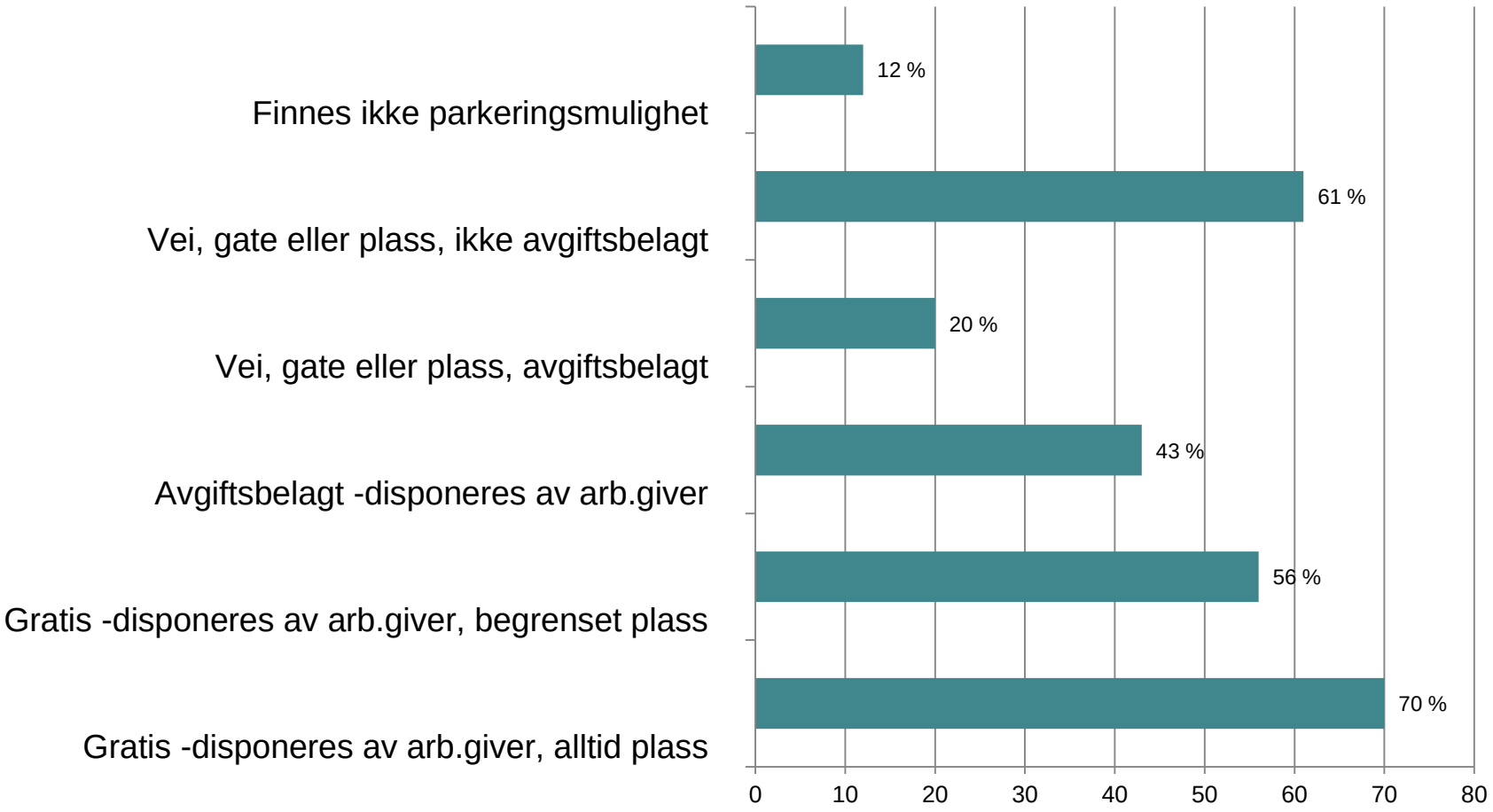
Vågane, 2012

Bedre kollektivtilbud gir mindre biltrafikk (Storo/Nydalen)



Tall fra Asplan Viak (2007): Evaluering av T-baneringen i Oslo. PROSAM rapport 155

Parkering


Finnes ikke parkeringsmulighet
Vei, gate eller plass, ikke avgiftsbelagt
Vei, gate eller plass, avgiftsbelagt
Avgiftsbelagt -disponeres av arb.giver
Gratis -disponeres av arb.giver, begrenset plass
Gratis -disponeres av arb.giver, alltid plass
12 %
61 %
20 %
43 %
56 %
70 %
0
10
20
30
40
50
60
70
80