

# Energy reduction potential of a decreased parking supply at housing

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## Aim

Highlight and discuss the CO<sub>2</sub> reduction potential in a development with:

- Fewer parking spaces than normal
- Well developed car sharing

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## Method

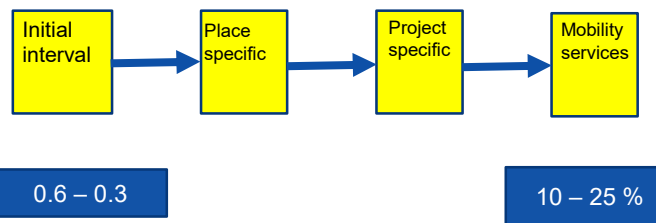
### 1. Case study with eighth Bloks-of-flats built with flexible parking standards in Sweden

- Surveys
- Semi-structured interviews
- Data from car sharing providers

### 2. LCA literature on CO<sub>2</sub> emissions from building parking spaces and cars

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## What is flexible parking standards – exemple from the city of Stockholm

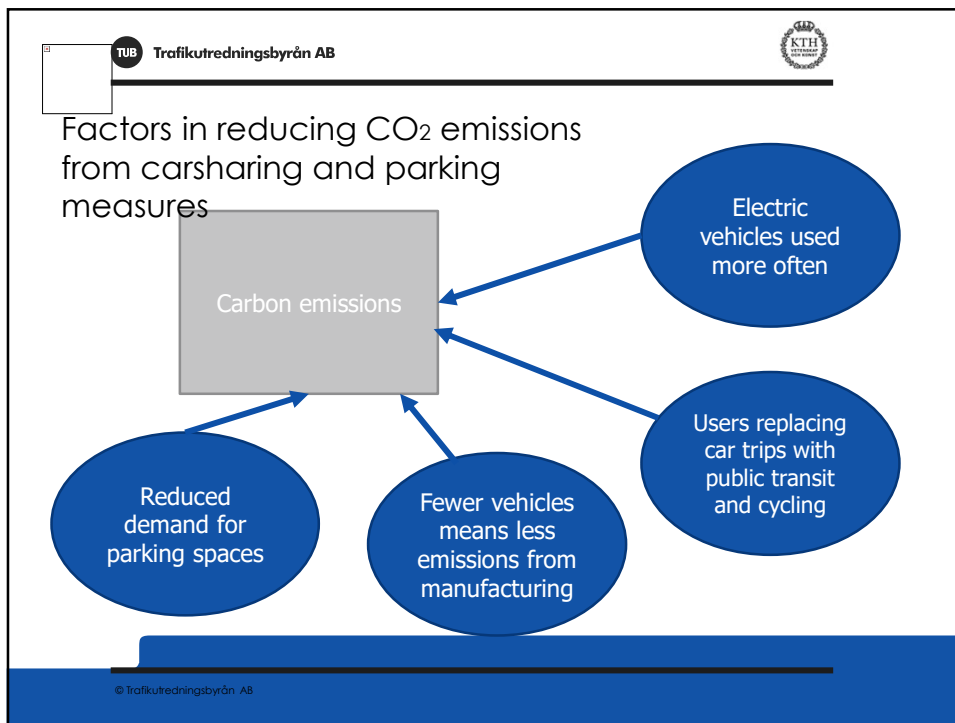


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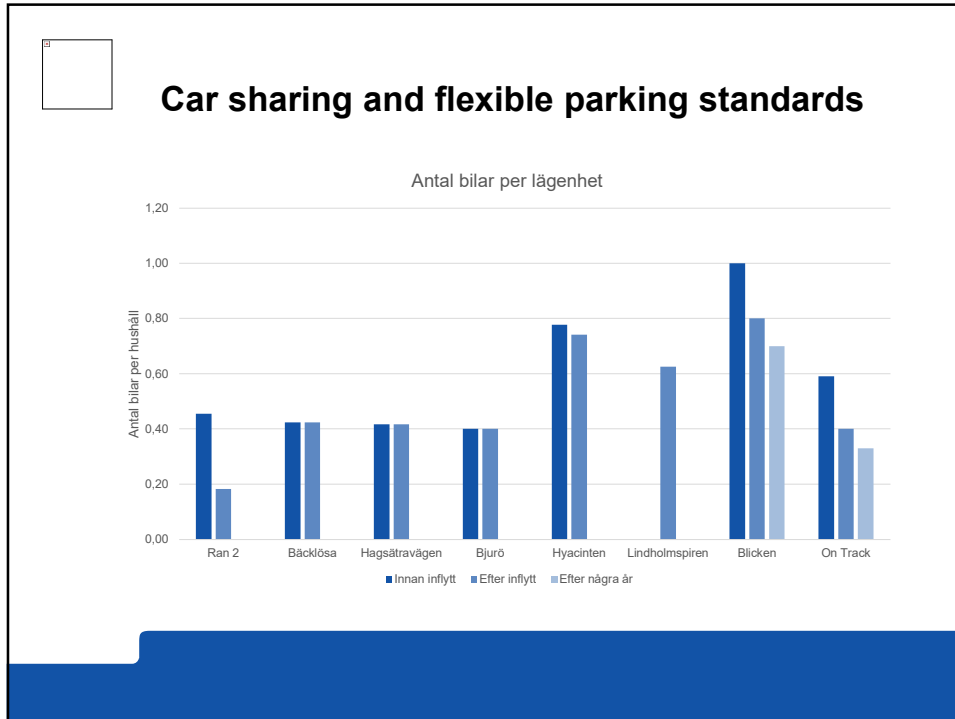
## Scenario elements

- Car sharing and flexible parking standard
- Lifecycle emissions from parking spaces
- Lifecycle emissions cars

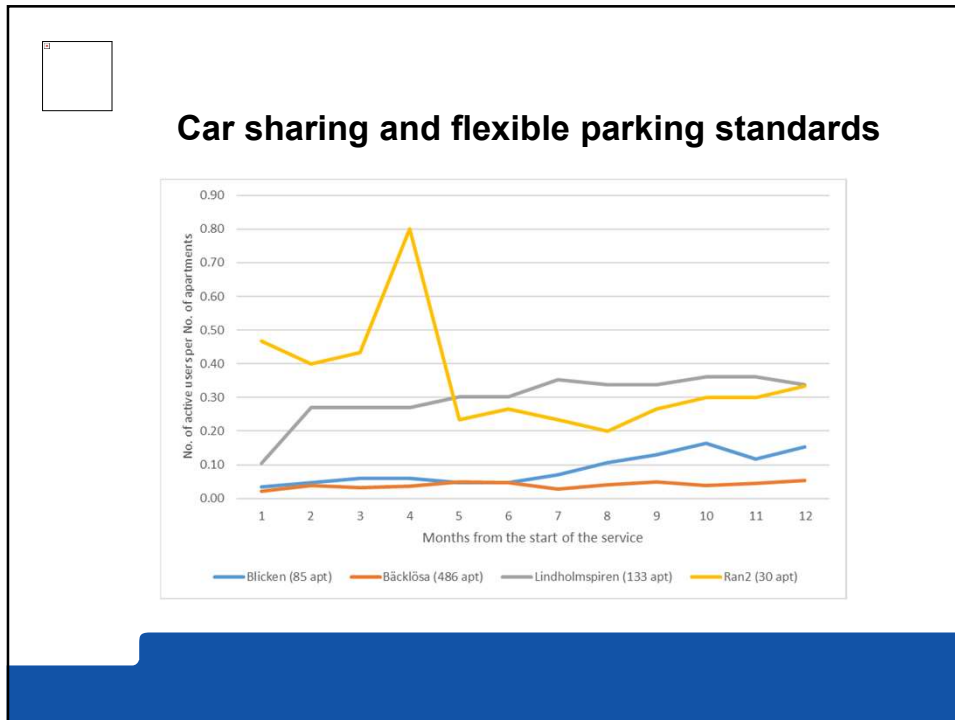
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### **Car sharing and flexible parking standards – when does a change in car ownership occur?**

- Often in relation with other changes in life – change of work, people moving in together/separating, the car breaks down etc.

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*"I don't have the car anymore. It was hit by [another car] and I had to hand it in to service. Don't need it anymore, but loan a car from mum and dad sometimes"*

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### **Car sharing and flexible parking standards – when does a change in car ownership occur?**

- Often in relation with other changes in life – change of work, people moving in together/separating, the car breaks down etc.
- Uncertainty regarding the booking of services

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### **Car sharing and flexible parking standards – when does a change in car ownership occur?**

*”Yes, right, that is correct [ - - - ] But I don’t know how it works [ - - - ] It sounds very good if it works, I believe [ - - - ] But it depends on the access. Because if I decide to play golf on Wednesday and I cannot get there. It is a question of how many cars are available and how it works” (Informant 15)*

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### Vad ger flexibla parkeringstal för effekt?

- Often in relation with other changes in life – change of work, people moving in together/separating, the car breaks down etc.
- Uncertainty regarding the booking of services
- Price and access to mobility services matters
- Parking charges and access to parking in the area matters

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### Car sharing and flexible parking standards – when does a change in car ownership occur?

*” I sold my car after moving in. It is so expensive with car parking and it is close to work now. I walk a lot and take the bus for longer trips”*

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## Lifecycle emissions from building parking spaces

House	Emissions rate for garage construction (kg CO <sub>2</sub> -eq/m <sup>2</sup> A <sub>temp</sub> )	Area of parking space (m <sup>2</sup> )	Emissions rate per space constructed (kg CO <sub>2</sub> -eq)
Blå Jungfrun (Erlandsson et al., 2018)	48.4	30	1 452
Strandparken (Larsson et al., 2016)	70	28.16	1 971
Nouvelle (Ejlertsson, 2019)	94	30	2 820

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## Lifecycle emissions from building cars

Year	Type of vehicle	Vehicle production (TCO <sub>2e</sub> )	Vehicle maintenance (TCO <sub>2e</sub> )	Vehicle End-of-Life (TCO <sub>2e</sub> )
2018	ICEV (fossil fuels)	11,6	1,5	-2,2
2018	BEVC (82 kWh battery)	19,5	0,9	-3,1
2018	PEHV 13 kWh battery (fossil fuel/electric power)	14,6	2,8	-3,0

Source: Berg Mårtensson et al. 2023

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## Exemple: CO<sub>2</sub> emissions from Ran 2

- 30 apartments in Västerås
- Electric car sharing (Tesla), 2 hours free per booking during 9 month (and an extra Van in the beginning)
- E-bike sharing, 3 hours for free per booking for the first 9 months
- 2 surface parking spaces
- 8 parking spaces in municipal parking facility (cash-in-lieu)

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## Ran 2



Source: Trafikutredningsbyrån

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### Exemple - CO<sub>2</sub> emissions from Ran 2

	Reference scenario	Ran 2
Number of flats	30	30
Number of parking spaces	15 garage spaces 15 surface spaces i	2 surface 8 through cash-in-lieu
Nb. Of car sharing cars	0	1
Distance trevelled with car sharing (km per year)	0	13 800
Cars before moving in	14	6
Distance travelled with private cars (km/år)	157 640	67 560

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### Exemple - CO<sub>2</sub> emissions from Ran 2

	Reference scenario CO <sub>2</sub> (ton)	Ran 2 CO <sub>2</sub> (ton)	Diff. CO <sub>2</sub> (ton)
Nb. Parking spaces	30	0	- 30
Car sharing	0	17	+ 17
Private cars	153	65	- 88
Car driving (per year)	41	14	- 27
Reduction when moving in			-3,3
Yearly reduction			-0,9

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## Discussion – What can we learn?

- Lifecycle emissions from producing cars and parking spaces is considerable
- Driving and production of cars most impact – is sharing a solution?
- Building parking spaces also have an impact – use existing spaces?

Building parking spaces



Number of cars



Car traffic