Energy savings from policy measures promoting modal shift to e-bikes

The Austrian experience

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- Austria had an EEOS between 2015 and 2020
- At the start of the EEOS:
 - All kinds of stakeholders wanted standardised methods for "their measures"
 - Policy level was interested in covering different measures and sectors with standardised methods
- Methods for mobility are generally a challenge (except for vehicle exchange)
- What is the net energy savings effect of using e-bikes?

Bottom-up method e-bikes | Starting point

- Ø Builds on a pre-existing method vehicle exchange (cars)
- Veeds additional information
 - Average mileage of e-bikes
 - Average specific energy consumption of e-bikes
 - Potential of e-bikes to replace car-driven mobility

Energy savings from e-bikes | formula

An e-bike is purchased in addition or as a replacement of a car

$FE_{tot} = n \cdot ((fec_{ref} - fecef_f) \cdot f_{rep} - fec_{eff} \cdot (1 - frep)) \cdot MI$

- FE_{tot} Total final energy savings [kWh/a]
- n Number of e-bikes []
- fec_{ref} Average final energy consumption of reference vehicle (car) [kWh/100km]
- fec_{eff} Average final energy consumption of an e-bike [kWh/100km]
- f_{rep} Factor of replaced mileage from car to e-bike [%]
- MI Average annual mileage of an e-bike [100km/a]

Energy savings from e-bikes | default values

Ø Basis: studies (e-bikes) and statistics

Parameter	Value	Unit
fec _{eff} Average final energy consumption of an e-bike	1.0	kWh/100km
fec _{ref} Average final energy consumption of car (stock)	59.4	kWh/100km
MI Average mileage		
Private e-bike	1,400	km/a
Company e-bike	Company specific	
f _{rep} Factor of replaced mileage from car to e-bike		
Private e-bike	34.5	%
Company e-bike	Company	specific

Experiences/observations

- Standardised method
 - was available for the whole period 2015-2020
 - does not take into account rebound effects
 - mainly used by obligated parties and by some municipalities
- Instrument: mainly subsidies on purchase of e-bikes
- ✓ Total reported savings of 20.8 MWh/a → tiny share of total savings 2015-2020
- ✓ → reported measures cannot be used to determine future potential

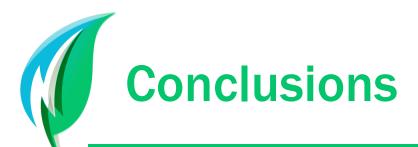
Approach for determining future potential

- Case analysed in Austria: Use of e-bikes replaces cars in everyday commute
 - Clearly defined case
 - Data available
- Input data
 - Average specific final energy consumption of cars and e-bikes per km
 - Annual total commute kilometres with cars (0-2; 0-5; 0-10; >10)
 - Potential of e-bikes to replace car kilometres
 - Assumption: journeys between 0 and 5 kilometres are mainly replaced with walking and bikes
 - E-bikes have a major effect for journeys between 5 and 10 kilometres

Scenarios for future potential

Parameter	Switch rate	Total annual energy savings (GWh)
0-2 km switch to walking	5 %	3
	10 %	5
	20 %	10
2-5 km switch to walking and bikes	5 %	13
	10 %	27
	20 %	53
5-10 km switch to e-bikes	5 %	31
	10 %	62
	20 %	124

20 % scenario for e-bikes: savings (124 GWh) are 0.04% of total Austrian energy consumption



Ø Bottom-up standardised method for e-bikes rarely used. Some possible reasons

- Other more attractive measures
- Administrative burden
- Cost efficiency of measure to achieve individual EEOS target
- Future savings potential
 - Summing up bottom-up savings of individual measures will in most cases not deliver a good estimation
 - Calculation of future savings potential needs good balance between sound data basis and plausible assumptions and scenarios

Thank you

Get in touch for more information!





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