Electric assist bicycles – what are their implications for cycle planning?

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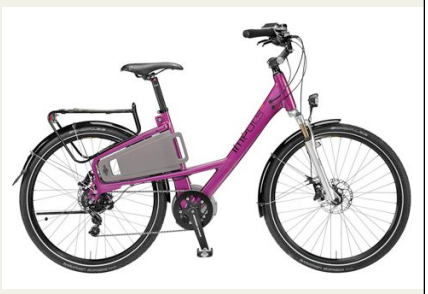

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CyCity:

- Swedish Research Programme on cycle planning
- 3 years, 1,6M€/2 M$
- Multidisciplinary, several partner institutions
- Goal: Improve knowledge about cycle planning processeses and cycle users preferences
- Contribute to more cycle friendly cities and cost-efficient planning of cycle infrastructure
- Please visit: www.cycity.se
- Two more CyCity presentations on Friday, 13:30 h – Kerstin Robertsson and Pelle Envall

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Background

BIKE europe Website for Bike Professional

Electric assist bicycle increase steadily in numbers and market share.

Germany 2011: Market in Positive Mood Thanks to E-bikes

Asian Electric Two-Wheel Market to Grow to 65 Million Units

Austrian E-bike Sales Taking Off


Electric Bicycle Sales to Touch 47 Million by 2018

Market share of sold bicycles:

- Netherlands, 2011: 15%; expected to reach 25%
- Switzerland, 2011: 14%
- Germany, 2011: 12%
- Austria, 2011: 6%, climbing
- Sweden, 2011: 3%, climbing

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Effect ”on the street”

Proportion of e-bikes on the street increases steadily. Potentially even quicker than sales figures might indicate, since one could assume they are used more frequently than conventional bicycles.

Switzerland, NL: 5-6% of the fleet.

Long term proportion of the bicycle fleet: ?? On the level of stabilised sales market share, after som years.

10-20% can be expected in some years in pioneering countries

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Are there any implications for infrastructure planning?

Research question:

What are the differences between e-bikes and conventional bicycles and what do these differences imply for the planning of bicycle infrastructure?

Is a ”conventionally” planned bicycle infrastructure suitable even with a high proportion of e-bikes?

Limitations: Only e-bikes according to EU:s definition (250W/no electric support above 25 km/h).

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Approach

Systematically compare e-bikes and conventional bikes and describe differences

Analyse whether these differences have any implication on cycle infrastructure planning.

Cycle planning manuals (e.g. CROW) have been used to cover cycle infrastructure planning aspects.

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Main differences

Engine-assist adds power to the cyclist

New user groups could be attracted to cycling, e.g. elderly –*potentially increased numbers of cyclists*

E-bikes reduce the risk for sweating – advantage if no shower/room for change is available. *Increases the number of potential cycle commuters*

Longer (commuting) distances are acceptable: Rotterdam study shows that the average commute with e-bikes was 13 km, with conventional bikes 9,2 km. – *implication for how extensive infrastructure is needed*

Transporting goods is easier since the motor compensates for the extra weight. Facilitates transport of children, trailers etc. – *potentially increased number of cycle trips*

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Main differences

Increased average speed: 24 km/h instead of 17 km/. Speed-increase most evident in climbs -> *average speed of cyclists increases*

Top speeds don't differ, but a higher proportion of cyclists will cycle fast -> *more space for fast cyclists needed, more overtaking*.

Gradients become less challenging – routes that previousely only were suitable for the well trained become accessible for more.

Acceleration from standstill is easier, especially uphills – avoiding stops is not as important as for conventional bicycles.

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Main differences

Price
E-bikes are more expensive than comparable conventional bicycle - demands on theft prevention increases

Electrical components, more complicated construction
E-bikes can be expected to be more sensitive to be exposed to rain, dirt, salt and extreme temperatures, even if this effect can be minimised by construction – demands on weather protection increase.

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Main differences

Weight

The addition of electric drive and batteries makes e-bikes by necessity heavier than comparable conventional bicycles. Often the bicycles are sturdier and not necessarliy lightweight in their construction since this is less important and costly. E-bikes are often between 3-10 kg heavier than comparable conventional bicycles.

The effect of additional weight is especially important for some user groups like the elderly.

The added weight makes it more difficult to lift or carry the bicycle, e.g. over stairs, into building, in trains, two-story parking etc.

Michael Koucky
Velo City 2012, Vancouver

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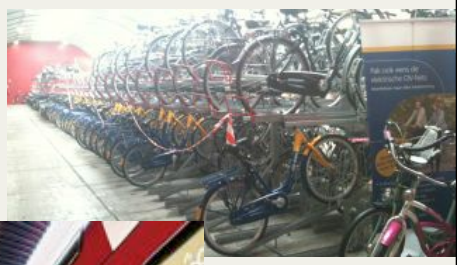
Main differences



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Implications

Infrastructure that is suited for conventional bicycles usually works for electric bikes as well without any problem. However, for a large propotion of e-bikes planning should consider:

- Plan for higher average speed, more room for overtaking
- Plan for increased numbers of cylists
- Plan longer routes/networks
- Direct routes with steep gradients are possible, but need alternatives and signalisation to warn cyclists on conventional bicycles. This should also be indicated on bicycle maps and route planners.

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Implications

- The need to lift or carry bicycles should be minimised – e.g. at bicycle parkings, bike shelters, passages, but also at cycle parking in residential buildings, public transport etc.
- Weather and theft protection become (even) more important. Preferably indoor parking.

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Conclusions

Some adaptations of cycle planning are recommended if the number of electric bicycles increses:

- Most important is a high standard of bicycle parking infrastructure, with theft and weather protection
- Speed differences can icrease, as well as the number or cyclists since new user groups can adopt e-bikes. This implies higher demands on capacity/ width of the infrastructure
- Average speed increases, infrastructure planning should consider this in planning – widh, curve radius etc.
- Commuting becomes interesting for longer distances, implicit ”planning limitations” (e.g. 5 km as acceptable distance for cycling) need to be revised.

Conclusions

- Infrastructure that demands that the bicycle is lifted or pushed uphills should be avoided since this is made (more) difficult by added weight.

Generally:

Most planning implication that follow if the characteristics of e-bikes are considered are also beneficial for users of conventional bicycles:

- **Increased capacity and planning for higher average speed.**
- **Improved theft prevention and weather protection in parkings.**
- **Extended network of cycle infrastructure.**

Thank you for your attention!

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