E-Bike City masterplan

Designing a car-reduced urban mobility future for Zurich

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Lukas Ballo *(corresponding author)*
Institute for Transport Planning and Systems, ETH Zurich
CH-8093 Zurich
ORCID: 0000-0002-0843-0553
Email: lukas.ballo@ivt.baug.ethz.ch

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Reaching the climate targets requires a substantial reorganization of our transport systems within only three decades. Technical innovations as well as massive policy changes are necessary to achieve the necessary effects. However, transport policy seems to be caught in a dilemma between sustainability and accessibility (Axhausen, 2022). Incremental approaches aimed at creating more sustainable mobility choices are being defeated in fear of jeopardizing accessibility: Proposals for cycling lanes stir up controversies about the removal of travel lanes and on-street parking; Congestion pricing or carbon taxes on fossil fuels spur opposition from 'car-dependent' suburban commuters, suggesting that the higher costs of driving are inequitable. As a result, the transformation of transport systems is happening at a slow pace, if at all. Instead, current perspectives on addressing climate change are based on largely unrealistic assumptions about electric cars and autonomous driving. Numerous studies suggest that electrification itself will not decarbonize the transport systems quickly and strongly enough, e.g., (de Blas et al., 2020; Gebler et al., 2020).

As a way out of the dilemma, we argue that strong overarching visions are necessary to inspire and guide the transformation. In an earlier work (Ballo et al., 2023), we proposed to test the *E-Bike City* as one possible car-reduced urban mobility future. As a starting point, it assumes that ~50% of road space will be allocated to a wide range of active, low-emission modes. The E-Bike City proposal should enrich the transport policy discussions with a tangible taste of living in a different future, including the design, as well as a robust estimate of the impacts.

In this work, we present a preliminary version of the E-Bike City 'Master Plan' for Zurich. It shows the street network after allocating large portions of road space to active modes, as well as exemplary designs for streets and intersections. The methodology of network design through simultaneous road space allocation and creation of lane topologies has been described in earlier work (Ballo and Axhausen, 2023). The impact assessment on cyclists accounts for the value of infrastructure changes, e.g., the benefit of converting mixed traffic into separated cycling paths. Multiple route choice studies (Meister et al., 2023; Prato et al., 2018; Jensen, 2019; Broach et al., 2012; Hood et al., 2011) provide the empirical *value of distance* (VoD) indicators showing the relative perception

of distance traveled on different infrastructure types by cyclists. The street and intersection design includes place-specific before-after comparisons modeled in a CAD software. The designs are informed by a comprehensive review of standards from different countries, as well as a set of workshops with planning practitioners.

The current working stage of the network design assigns the maximum possible proportion of road space to cycling infrastructure while assuming the following constraints: (1) All buildings must be accessible by at least one lane for motorized traffic, (2) All major public transit routes must be able to operate along today's routes, and (3) The network must maintain a hierarchy, where motorized traffic is channeled on main streets by providing connections without detours through neighborhoods. The preliminary results indicate that the proportion of road space allocated to cycling in Zurich can be increased from 11.7 to 36.4%. The average shortest path for motorized traffic would increase by 36%. Using the VoD indicators, the cycling infrastructure improvements would result in a 20% decrease in the average shortest path as *perceived* by cyclists. Further alterations of the constraints, as well as including real origin-destination pairs in the impact assessment are planned to refine the results and explore further design potentials.

The master plan should accelerate the process of sustainable mobility transitions by inspiring high-level discussions about the future of urban transport systems, rather than fostering wicked negotiations about incremental changes in the status quo. Undoubtedly, adopting such a policy direction would change the daily lives of many. However, a taste of the future it creates, including both its negative and positive aspects may encourage conversations about ideas of the future rather than today's positions.

The presentation at the mobil.TUM conference should help gather feedback, make connections with other people working on related topics, as well as improve the storytelling towards the public.

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