User Needs Assessment – City Report City: *Hamburg*

1 Approach

This user needs assessment builds upon (1) an online survey to assess city aims, implementation aspects, and key barriers and limitations to e-mobility solutions and (2) a set of stakeholder interviews. The interviews were carried out by Wuppertal Institute, UITP and Virtual Vehicle between November 11, 2020 and December 14, 2020. Interviewees represented the following stakeholder groups:

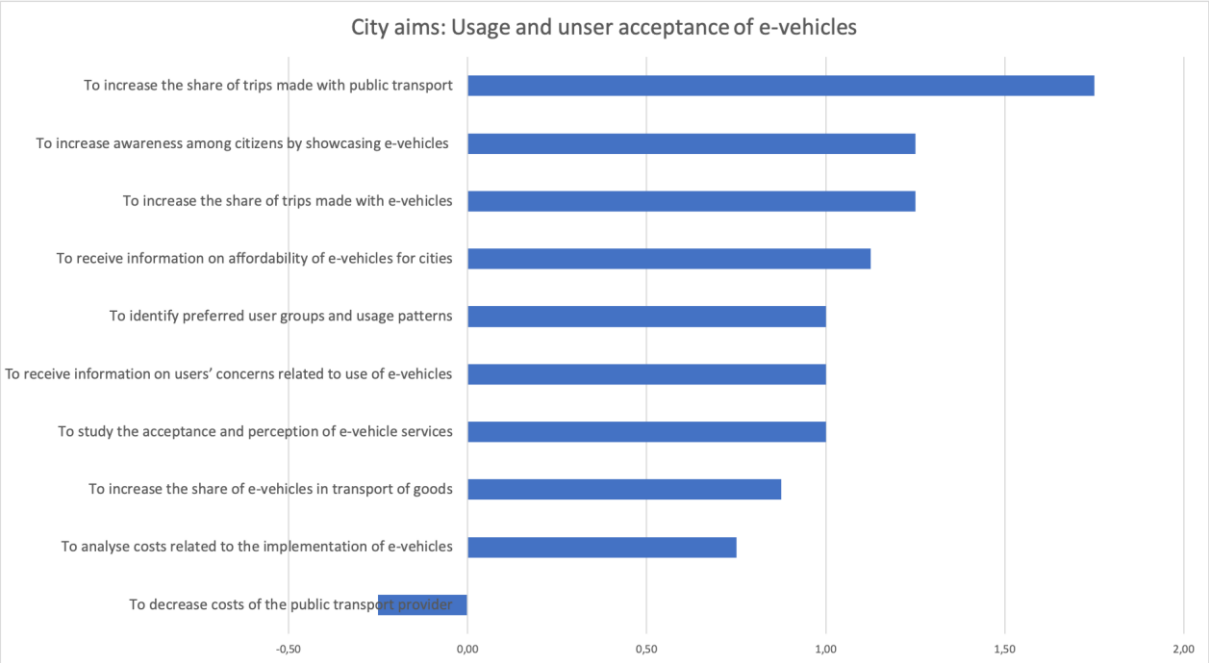
Stakeholder Group	Company / Institution	Number of interviewees
Public transport operator	Hamburger Hochbahn AG, department for Change and innovation	2
	Hamburger Hochbahn AG, ITS department	2
City administration	Department for Transport and Mobility Transition	1
	Department for Economy and Innovation Hamburg (BWI)	1
Mobility provider	Ioki	1
Implementation agency	hySOLUTIONS GmbH	1
Charging provider	T-Systems	1

The user needs assessment is an ongoing process. Further interviews will be conducted as the demo project evolves and additional relevant stakeholders become visible and/or available. These include providers of new mobility solutions, passenger associations, academia and research projects, or the environmental administration. Findings will continuously be integrated into this working document.

2 Results – Survey

This section outlines the most important findings of the online survey. We received 8 responses, mostly from public transport operators. Respondents were asked to evaluate the importance of city the following aspects, using a scale from -2 (not important at all) to +2 (very important).

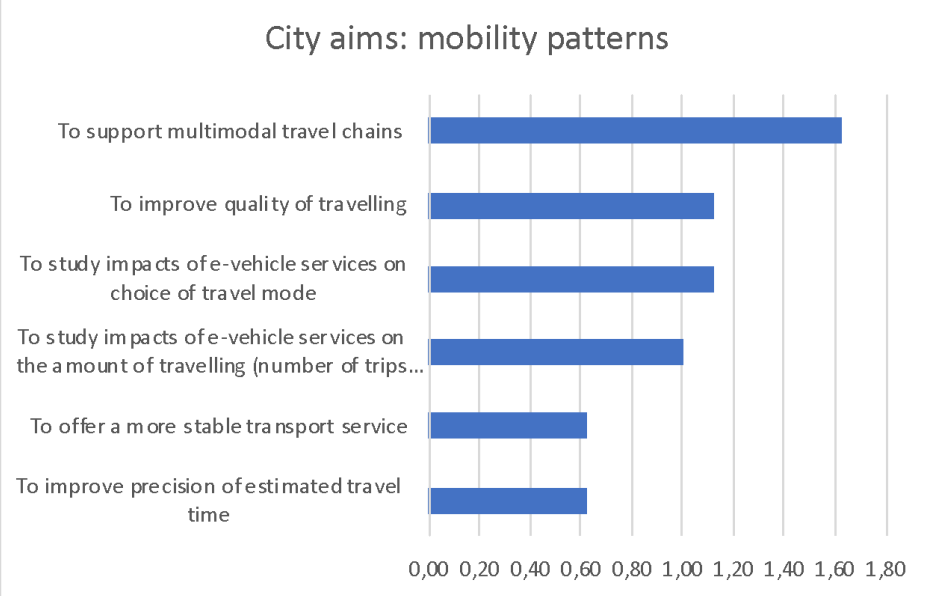
City aims- Usage and user acceptance of e-vehicles



Regarding the usage and acceptance of e-vehicles, respondents rated the feeder function for public transport highest (score 1.75 out of 2). The increase of awareness among citizens and the increase of e-vehicle trips were also considered important city aims, but achieved a lower rating. This suggests that the demo project should be considered as a building block to the entire public transport system (ensuring first and last mile connectivity of mass transport systems) rather than an individual transport option on its own.

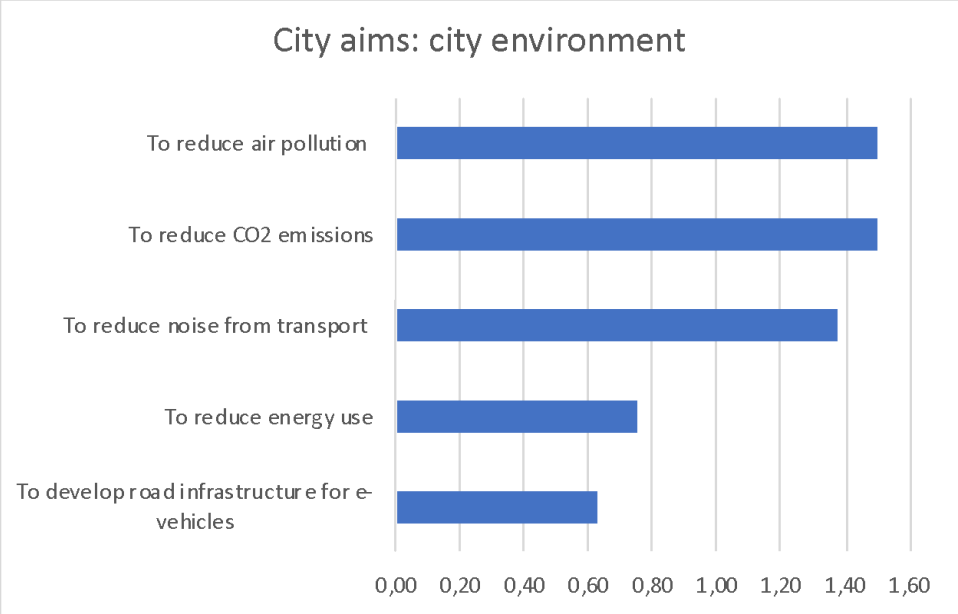
Gaining a better understanding of affordability, user groups and usage patterns, user concerns, and acceptance of e-mobility solutions were also considered important aspects and achieved a positive rating between 1,25 and 1. Decreasing the costs for the public transport operator was the only category that received a negative rating (=not important).

City aims: mobility patterns



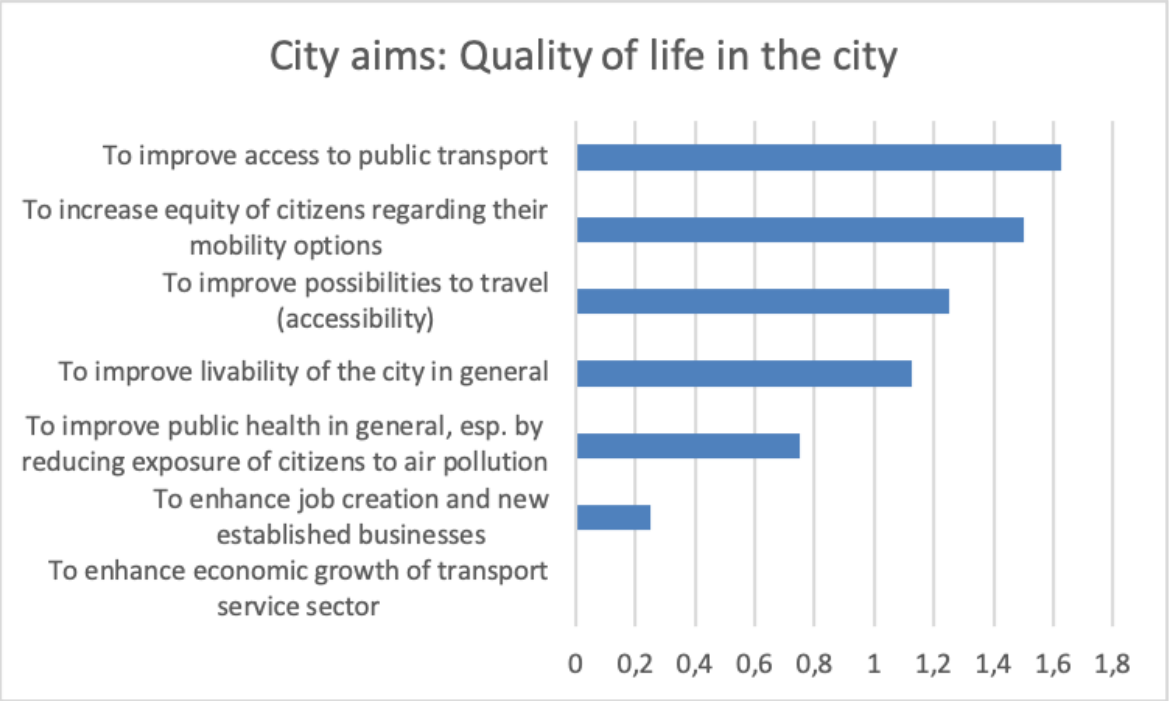
The focus on multi-modality and the service function of the demo project for the entire public transport system – as identified in the question above – was confirmed in this question: supporting multimodal travel chains was considered most important (score: 1.75 out of 2). Improving the quality of travelling and studying the impacts of e-vehicle services on the choice of travel modes also received high ratings (1.13). The stability of transport service and improving the precision of estimated travel time was considered less important, though still with a positive rating.

City aims: city environment



Concerning the environmental dimension, the reduction of air pollution, CO2 emissions and noise were rated very important (rating between 1.38 and 1.5 out of 2). Reducing energy consumption and the development of charging infrastructure was also considered relevant, albeit with lower ratings (<1).

City aims: quality of life in the city



Here again, the contribution to the public transport system was highlighted: improving access to public transport and equal mobility options for all received the highest rating. Job creation and economic growth opportunities were considered less relevant.

Implementation and obstacles, limitations and barriers

Regarding the implementation (questions 12-17), the most important findings are:

- 7 out of 8 respondents rated transport of people as most relevant use case for Hamburg's e-mobility solution.
- Suburban areas (7/8) and the city centre (6/8) were identified as the venues where the e-vehicles will be used.
- Main target groups of e-vehicles in Hamburg are 'all citizens' (6/8) Three out of eight respondents also mentioned each 'commuters' and 'young people'.
- E-vehicles may be used most for commuting (7/8), followed by trips related to leisure (6/8) and other job-related trips (5/8). Shopping (4/8) and school trips (2/8) were mentioned less frequently.
- For transport of goods, e-vehicles received low ratings between 4 (City and private companies) and 1 (other entrepreneurs).

The most challenging factors for successfully implementing the e-mobility solution were: investment need for the infrastructure (6/8), a lack of financial resources (4/8) and a low user acceptance (4/8). Other barriers were considered less important.

3 Results – Expert Interviews

3.1 Aims of the city and Expectations of Stakeholders

Window of opportunity and positioning as a role model for innovative transport system

Overall, interview partners used a very positive and innovation-oriented framing of e-mobility solutions in Hamburg (rather than a problem-driven perspective). They perceived a window of opportunity for changing citizen's mobility behaviour towards multi-modality and public transport: while elder population groups tend to use their private cars, the increasing share of younger people in the city is considered to be more open for innovative solutions, to be more flexible in their mobility behaviour, and to be more willing to use multimodal transport options and sharing systems.

These circumstances are perceived as an opportunity for the city to become a role model for innovative transport system (ITS) cities with a future proof mobility system. Interviewees from the public transport provider compared solutions in Hamburg to the performance of other German municipalities (e.g. compared to Berlin for an integrated mobility app; or to Munich in relation to e-charging infrastructure), which implies a perceived 'race to the top' for the most innovative mobility solutions between German cities.

Interviewees agreed that their most important objective was to push the mobility transition, to implement and to test new solutions and to work towards Hamburg's image as role model for future mobility. One focal point that was mentioned by several stakeholders is the upcoming *Intelligent Transport Systems Congress*, which is scheduled to take place in Hamburg in October 2021.

Venue for new mobility solutions

One interviewee mentioned the absence of major car industry in the city as an asset: Being a "user-venue" and not a "manufacturer location" allowed to test and to validate a variety of new mobility solutions, without the pressure to accommodate the concerns of local car manufacturers. As a result, a range of e-mobility services are being implemented in Hamburg: These include Volkswagen's ridesharing service MOIA, which uses exclusively e-mini buses and currently operates under an experimentation license; and the ridesharing service IOKI, which is a subsidiary of the major German railway company (Deutsche Bahn). Other than MOIA, IOKI operates under a line concession for the regional transport organisation, serving a route with fixed start and destination points but with flexible stops along the route. Moreover, several e-scooter providers are active mostly in the city centre, but tending to expand their area of operation towards the outskirts.

The regional transport organisation HVV has recently implemented a ***mobility app*** which allows an integrated booking of mobility services. The app currently includes the public transport operators HVV and Hochbahn AG (which operates the subway and large parts of the city bus system), but also the private ride sharing operator MOIA. An integration of further car- and bike-sharing providers (ShareNow, Cambio and StadtRAD) is planned for the future. In context of Hamburg's demo project, the E-scooter provider TIER Mobility should be integrated in the mobility app. Still, interviewees mentioned that the payment for private operators takes place via their individual apps; a deeper integration that also includes a payment functionality will be explored in the future. The development of the app was funded through the city administration and using federal funds.

Implementation of the 'Hamburg Takt'

Multimodal public transport should become more attractive and the 'natural choice' for mobility options in the city. Getting citizens out of their private car and into public transport required the provision of new solutions specifically outside the city centre: By 2030, the city aims at providing access to a transport service within 5 minutes for all citizens in the entire urban area. The realisation of this "*Hamburg Takt*" requires the integration of on-demand mobility solutions with traditional public transport. Some mobility hubs that facilitate multimodality and combine public transport with shared mobility offers already exist in the city.

Environmental Concerns

Beyond the innovation side, most interviewees also stressed the need to reduce greenhouse gas emissions, as stated in Hamburg's *climate protection plan.* The plan foresees the reduction of CO2-emissions by 55% until 2030 and by 75% by 2050 (compared to 1990 levels). The sectoral target for the mobility sector is -45% by 2030. The city's updated climate protection plan explicitly mentions measures such as 'linking the traditional public transport with sharing and on-demand services' and the provision of multimodal mobility offers in residential areas as contributions to achieve the city's climate targets.

Expected insights from the demo project

Regarding the insights they hoped to gain from the demo project, most interviewees conceived the demo as one – rather small – building block to make public transport more attractive and accessible.

Concerning the ***operational aspects***, interviewees expected to better understand whether the operation is financially viable, how e-scooters can be integrated into a high quality and broadly accepted public multimodality offer, and how potential users could be incentivized to use shared electric scooters as first- and last mile services. This also relates to the specification of the scheme, for example whether the system should be station-based or free-floating (with defined return-zones around public transport stops).

Other stakeholders were interested in ***measuring impacts***, i.e. whether the demo contributes to a shift from private car use to public transport, and which means of transport are being replaced (car, walking, cycling, bus). Participants also indicated interest in the average length of trips and how many person-km are being replaced, also in relation to trip distances in the city centre, which are rather short.

3.2 Regulation

The regulative environment was considered suitable for the implementation of the demo project. No stakeholder raised concerns about regulative barriers for the demo project or the upscaling. The 2019 'Personal Light Electric Vehicles Regulations' approved and regulates the use of e-scooters in public areas. Interviewees stressed that free-floating sharing systems do not require an official permission; and the on-going operation of e-scooter providers in the city centre proved that using and sharing e-scooters was legally allowed.

The low legal requirements, in turn, led to the concern that the city might lack the means to effectively regulate the operations of e-scooter sharing providers. Up until now, the city used Memorandums of Understanding (MoU) to influence the operations of scooter providers. MoUs include the consent not

to exceed the maximum number of 1,000 e-scooters per provider, the establishment of a complaints management system, or the provision of mobility data. Moreover, the city has the competence to remove improperly parked scooters. While MoUs were considered relatively effective in such respects, they could not be used to force providers to expand their operation area beyond the city centre.

3.3 Obstacles, limitations, barriers

Interviewees identified the general ***public opinion*** towards e-scooters as a potential barrier to the demo project: Scooters tended to be considered as 'urban pollution' – specifically if they block sidewalks – or as vehicles for tourists rather than as a genuine means of transport. One interviewee raised concern that weather conditions in winter might reduce the demand for shared scooters.

Some interviewees raised concerns that the designation of ***physical parking and return zones*** around public transport stations required the consent of the land owners. This might prove difficult in cases where the ground is not owned by Hochbahn AG and/or when city districts might be reluctant to dedicate scarce public space. Still, other stakeholders pointed to the general willingness of city districts to support the mobility transition and to reduce car traffic, to the relatively minor space requirement of e-scooters and charging solutions compared to e-cars and e-buses; others suggested to define virtual return zones rather than physical zones around public transport stations.

Finally, some interviewees pointed to the ***logistics behind*** the sharing systems: relocation, charging, and servicing of the scooters was still carried out with diesel vans. They raised concerns that this might reduce public acceptance and compromise the environmental performance of the sharing system.

The ***political environment*** was considered extremely supportive. Specifically, the entry of the Green Party into a government coalition was conceived as a facilitating factor for e-mobility projects, the extension of the public transport offer, and pedestrianisation of inner-city areas. The relevant ***administrative departments*** and city districts were also considered to play a supportive role. The former Department for Economy, Transport and Innovation was split up and a new Department for Transport and Mobility Transition was founded in 2020. E-mobility and the development of public and private charging infrastructure remained under the responsibility of the Department for Economy and Innovation. Despite split competencies and partly diverging objectives (i.e. the reduction of private motorised mobility vs. electrification of public and private mobility). interviewees from both departments mentioned a high level of exchange on the operational level between the two entities.

3.4 Sustainability of the e-Mobility solutions to be implemented

Social dimension:

During the interviews, ***E-mobility in general*** was positively correlated with healthier cities and higher life expectancy. Still, the socially unjust distribution of scarce urban space in favour of motorized individual transport could not solved through electrifying private cars but required a profound change of the mobility system.

Regarding the ***individual demo project***, the dimension of accessibility was stressed by most participants. This was mostly related to the 'Hamburg-Takt' which requires that by 2030, each citizen should have a mobility service available within a 5 minutes reach. Solving low accessibility issues – specifically in suburbs and in the southern city area – required the integration of flexible public transport options. Some interviewees also stressed that public transport offer needs to remain affordable and potential additional costs should not be passed on to passengers. Other interviewees

mentioned that scooters parked on sidewalks or knocked over could be a dangerous obstacle for elderly or visually impaired persons.

Interestingly, the useability of e-scooters for elder or young people (below the admission age of the scooter providers), for people with disabilities, or for people with small children was not questioned during the interviews.

Ecological dimension:

Participants noted a positive contribution of the (electrified) ***public transport system*** on the emission of greenhouse gases and air pollutants. Since Hamburg exceeded European air pollution limits, the city has imposed transit bans on some streets for diesel fuelled vehicles. Interviewees agreed that shared scooters could support the modal shift towards public transport and thus contribute to reducing transport related environmental problems. Still, the ecological benefits of the ***demo project in isolation*** were critically questioned:

- Interviewees mentioned that e-scooters had a short service life expectancy (due to their technical lifetime but also to vandalism) which leads to a high level of resource use.
- The energy provision needed to be based on renewable energies; and the collection, servicing, and relocation of e-scooters still was done with diesel fuelled vans (though one interviewee mentioned that the MoUs asked for using emission free vehicles and renewable energy).
- Other interviewees were concerned about the substitution of walking / cycling or public transport rather than replacing private car use. Some stakeholders mentioned that the use of scooters should be 'fun', implying that the distance would normally not go beyond the way to next public transport stop.

Economic dimension:

Stakeholders from the implementation agency and the mobility provider stressed that mobility offers needed to be economically viable over the long-term, specifically for private operators. However, they also noted that new solutions often required support for the initial operation period and for upfront investments in vehicles or charging infrastructure. For example, a representative of an implementation agency claimed that e-buses were more expensive to purchase than diesel fuelled, but achieved lower total cost of ownership over the entire life-cycle. Financial support could be provided through national funding programmes or in the framework of research projects.

On the other hand, representatives of public transport operators expected that due to the low transport demand in sub-urban areas, new mobility services required continuous financial support.

In a broader economic sense, the demo was considered as one building block to the City's aim of becoming a role model for ITS innovations and future mobility systems and thus a potentially positive contribution of future economic development.

3.5 Impact on existing business models

The impact of the demo project on the existing mobility service sector was considered minor, due to the small size of the demo. Other interviewees claimed that scooter trips ('not further than to the next public transport station') were too short to be profitable for taxi drivers. Since no other mobility services were active in the demo areas, interviewees expected no impact on existing business models.

3.6 Implications for Planning and Urban Development

Mobility Planning:

Getting people out of their private car and into public transport requires a convenient, easy to access, and reliable public transport offer. Some interviewees stressed that the transfer from one means of transport to another should be easy. Multimodality required integrated thinking and should be facilitated through physical exchange hubs and IT solutions (such as an integrated app).

Urban Planning:

Interviewees saw the most important implications for urban planning in the local impacts on the urban streetscape around mobility hubs: planners need to provide parking and charging infrastructure in densely populated districts with competition for scarce urban space. Experiences gained from demo projects (what works / what does not) could be used to design new urban developments in a way to discourage private car use. Successful examples from previous experiments that were replicated comprised the provision of car sharing stations in residential districts. Moreover, some interviewees mentioned the importance of integrated planning and of a public participation process.

Energy Planning:

Due to the small scale of the demo project and the decentralised charging of e-scooter batteries, no major impact on the energy grid was expected and no need for an exchange with grid operator was needed at that stage. Most interviewees expected that a broader electrification of the mobility system, including private cars and buses, will impact the electricity network in the long-term. A profound change of the fuel base – from oil to electricity – could lead to a 40% increase in peak loads and required the digitalization grid connection points.