Abstract

Due to the progressing climate change and increasing fuel charges as a consequence of shrinking oil reserves and global rising demand, electric vehicles have frequently come into public discussion over the last years. The government as well as the car and electric industry worked out several ways to bring out and establish electric vehicles for the mass market. However, this is accompanied by several challenges concerning electric vehicles, like the short range combined with long charge time and high initial cost.

Within the introduction of this master thesis, the current status quo of electric mobility is described. By the help of a review of the history of electric mobility it is revealed that electric vehicles aren't exactly a new technology, rather they exist for over a 100 years in several forms in the automobile and electric industry, still facing the same challenges ever since. Beside these challenges, the potential of electric mobility is described within this thesis emphasizing that electric mobility is already a serious alternative to mobility based on fossil fuels. Based on that insight, different measures of stimulation and prioritization for electric vehicles helping to exploit the potential of electric mobility are observed. This shall support a successful launch of electric vehicles in the mass market.

To capture as many measures as possible, in a first step a catalogue of measures is designed. Therefore, various governmental programs and initiatives, scientific literature and traffic management measures from organizational practice are included. Afterwards, the measures are described in detail and classified into financial, transport planning, mode of transport overall and other cumulative measures increasing the attractiveness of electric mobility overall.
The financial measures are structured into direct and indirect measures. They are examined, according their suitability to support a successful market launch of electric vehicles. In this context, they are checked for practicability and legal realization. Additionally, advantages and disadvantages are discussed.
The transport planning and mode of transport overall measures are evaluated by a self-developed hierarchically structured system. The system is aligned with the transport planning objectives. Thus, it is classified into the topics of safety, fulfillment of the mobility needs, environmental protection of natural resources as well as economic efficiency.
In terms of the transport planning measures it is discussed, how the measures should be organized. Thereby, the requirements of traffic engineering are specified, which have to be fulfilled that the measures can be implemented after all. As all measures represent prioritizations of electric vehicles toward conventionally powered vehicles, it is encouraged that licensing offices do also give out blue tags to vehicles with zero emission. As a result, the legitimization of prioritization for electric vehicles on basis of current traffic legislation is made. Furthermore it is checked, if the measures are legally realizable, meaning to review for the current existence of a potential legal basis and if necessary a reformation of them. If the implementation of a new measure seems being reasonable, further examinations will be made.
In terms of the mode of transport overall, measures are considered under the aspect to stimulate intermodality and hence to integrate electric mobility. It is also considered, that the measures would also show their effect, without integrating of electric mobility. Nevertheless, they are also checked, if and how they can integrate electric mobility. Therefore, it is mentioned, how the measures can be developed and which requirements have to be fulfilled. As the measures aren't explicitly designed for public use, it is necessary that they provide an additional economic value making a long term realization realistically. The measures that are expected of having realistic chances to get realized in practice on mid-term base and that are expected of having direct effects on several objective fields of the self-developed system are further examined in the preceding evaluation.
The further examined measures just make sure that the catalogue of measures is complete. They do not get any further attention within the evaluation.

The evaluation is executed in a structured, partially formalized, verbal-argumentative, qualitative way. Because the evaluation is qualitative, no quantifier of the objectives is included within this thesis. All measures are examined on consecutive order. To make sure that the evaluation is rigorously based on facts, all boundary conditions are defined and stakeholders directly affected by the measures are identified. Afterwards, all effects of the measures on the self-develped system as well as their size are estimated with regard to the stakeholders and all additional important aspects. This is conducted in a twofold way. On the

one hand results from prior literature are presented, and on the other hand logical and reasonable considerations partially supported by expert interviews are provided. They have the purpose to emphasize that there is no lack of clarity during the evaluation of the measures. This is also assured in the development of an interview guideline with several topics that are evaluated and discussed by different experts. They can be asked in a semi-structured interview based on the guideline. In conclusion, all measures are evaluated by the below objectives of the system with the following likert scale:

++	the measure has a very strong, positive influence on the criterion of objective
+	the measure has a weak, but positive influence on the criterion of objective
0	the measure has no, only an extremely little or a not assessable influence on the criterion of objective
-	the measure has a weak, but negative influence on the criterion of objective
- -	the measure has a very strong, negative influence on the criterion of objective

For the evaluation it is assumed, that there will be one million registered electric vehicles in Germany, relating to a percentage of about 2 % of all currently registered vehicles overall. After an extensive discussion, the positive and negative consequences of all respective measures become clear. The results for all measures are visualized in tables throughout the thesis and based on these results, recommendations and further research necessity to every measure is discussed. The following results have been achieved within this thesis:

As it is not maintainable according to an economic point of view to clear a lane only for electric vehicles, the provision of exclusive lanes for electric vehicles is denied. Moreover, there isn't enough space in major cities' roads, streets, and motorways to collocate an additional lane.
Whether the removal of access restrictions for electric vehicles is feasible or not, strongly depends on local requirements. If the negative effects can be prevented in an isolated case, a conversion is recommendable.
As the measure "aggravation of zones of environment" is not realistic, it is recommended to at least provide small access ban for conventional powered vehicles, where the local requirements allow and support that.
The measure "financial privilege at park and ride parking facilities" can be realized for now without almost any risks of negative effects. However, the measure has to be checked with increasing percentage of electric vehicles.
A reduction of parking fees for electric vehicles at communal parking facilities and parking slots in downtown it is observed that this might lead to induced traffic. Hence, it can only be recommended with reservations.
It is advised against an increase of parking fees for conventional vehicles at communal parking facilities and parking slots in downtown, as this will lead to mobility getting too expensive. The measure is suitable to manage parking space in general but it is not suitable do support electric mobility in particular.
A privilege for electric vehicles by the use of park and ride parking facilities will not lead to negative effects, if the planning is made cautiously. Hence, it is advised here, although a positive effect can only be expected, if the park and ride facility is highly frequented.
A privilege in the rights of use at communal parking facilities and parking slots in downtown is only supposable, if particular requirements are fulfilled and after a more detailed examination.
It is also advised against temporal privileges at communal parking facilities and parking slots in downtown, because one can expect barely significant positive effects while parking space management is also negatively influenced by it.
Furthermore, it is ascertained that car sharing with electric vehicles can deliver a major contribution to disperse electric mobility and with it new forms of mobility.

Beside the namedropped measures, the clearance of exclusive bus lanes to electric vehicles is considered in the evaluation. Moreover, this measure should be subject to further examination, which should make clear, if and to what percentage of electric vehicles of the hole traffic volume a clearance is possible and sensible, without noticeable decreasing the bus traffic quality. Therefore, an approach is elaborated using HBS making it possible to calculate how many vehicles in addition to busses can pass an intersection during a predetermined delay. The results of this analysis show that exclusive bus lanes can be cleared to electric vehicles under certain circumstances, without noticeable influencing the traffic quality of the busses.

Finally, the results of all measures are illustrated in a figure representing the overall view.