

The role and potentials of electric vehicles in corporate mobility management

Steven Kulawik¹, Tim Hettesheimer^{2*}, Simon Funke²

¹Karlsruhe Institute of Technology (KIT), D-76187 Karlsruhe

²Fraunhofer Institute for Systems and Innovation Research ISI, Breslauer Str. 48, D-76139 Karlsruhe,
*tim.hettesheimer@isi.fraunhofer.de

Summary

Almost half of all car traffic in Germany results from company-related reasons. Corporate mobility management (CMM) is thereby considered as a main lever to reduce traffic and resulting CO₂-emissions by making the company-related traffic more efficient and environmentally and socially compatible through specific measures. The substitution of the company's vehicle fleet by electric vehicles is hereby seen as one of the most popular measures. So far, it has remained unanswered to what extent companies, especially SME, are really applying CMM, which aims they pursue and which measures are therefore implemented. To shed light on the diffusion and motivation for CMM, this paper shows the results of a survey in the technology region of Karlsruhe (Germany). The results indicate that CMM primarily fulfils social objectives prior to ecological or economical ones. While the most commonly implemented measures are the promotion of cycling and the electrification of corporate vehicle fleets.

Keywords: corporate mobility management; electric vehicle (EV); fleet; policy; mobility system;

1 Introduction

Of the 800 million tonnes of CO₂ emitted in Germany in 2017, 21 % was accounted for by the transport sector [1]. In passenger transport, motorised private transport dominates with a share of 80 % [2], contributing to a further increase in greenhouse gas emissions in the transport sector, partly due to a further increase in the number of passenger cars (+1.5 % in 2017) [3]. However, by 2050, the EU plans to reduce greenhouse gas emissions by 80 to 95 % compared with the level of 1990 – in order to achieve this goal, the German federal government plans, among other measures, to increase the support for electric mobility. For a successful promotion, corporate fleets are of particular relevance, since 64.4 % of all newly registered passenger cars in Germany are commercial registrations. If considering the short holding period, the trend towards more fuel-efficient fleet vehicles and the higher average mileage of commercial cars, this creates good economic and ecological reasons for the introduction of electric cars in company fleets. Such an approach is also supported by the state level: According to the German "Climate Action Plan 2050", the government sees the "electrification of the new car fleet" as a central element in the package of measures

known as "Milestones 2030" [4, 5]. Thus, the developed climate action plans overlap with corporate mobility management (CMM) both in terms of motivation and measures: CMM aims to make corporate transport more environmentally and socially sustainable and more efficient in terms of time and costs [6]. In the existing literature, various potential fields of action, such as electric mobility [7], bicycling [8] or public transport [9] can be found.

However, although the potential measures are well known, information about other relevant issues, such as the diffusion and motivation for CMM, are still rather unexplored. Thus, in this paper, the significance in business practice is to be researched: Where is action currently being taken? How important are the individual means and concepts of transport for a more sustainable organization of corporate transport? To what extent does CMM really influence the situation of a company in terms of economic, ecological and social aspects? And finally, what role are electric vehicles playing in this context?

2 Data and methods

A quantitative online survey and qualitative expert interviews were conducted to answer the questions about the significance and influence of CMM. Both surveys are aimed at companies from the Karlsruhe technology region¹, with a random sample taken for the survey and a targeted selection of companies operating CMM for the interviews in order to gain insights about the process and on the effects resulting from the implementation. A total of 363 companies from the Karlsruhe technology region replied the survey. The invitation to the survey was sent out to about 4250 companies, resulting in a response rate of slightly more than 8%. Figure 1 below shows the regional distribution of responses from the technology region of Karlsruhe by the first three numbers of the zip code.

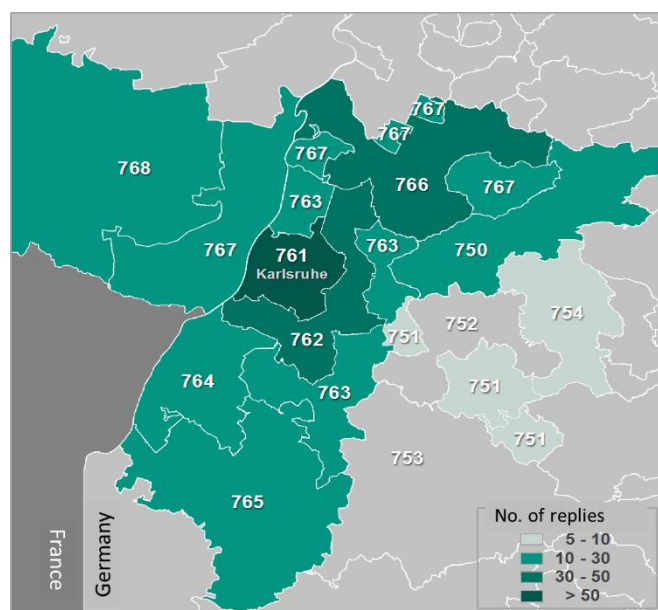


Figure 1: Own illustration²

Of the 363 participating companies, 46.8% had fewer than 10 employees; 34.4% had between 10 and 49, 10.5% between 50 and 249 and finally 8.3% had 250 or more employees. The most represented sectors are construction with 16.5%, freelance/scientific/technical services with 16.3%, manufacturing with 13.8%, information and communication with 13.2% and trade with 12.1%.

¹ The region around the city of Karlsruhe, which is an industrial and technological center in the southern part of Germany, comprising approximately 3.240 km² and 1.3 million inhabitants.

² Source of raw map data:© OpenStreetMap contributors, freely available under "Open Database Licence"

3 Results

The results indicate that in total, approximately one in five companies applies a CMM (see figure 2). As one might expect, the more employees a company has, the more frequently a CMM is applied; for large companies, this means a share of ~ 66 %. In average ~ 18 % of the participating companies have implemented a CMM. In addition, a slight difference in the implementation rate can be observed between Karlsruhe city centre (23%) and the neighbouring regions (~ 16%).

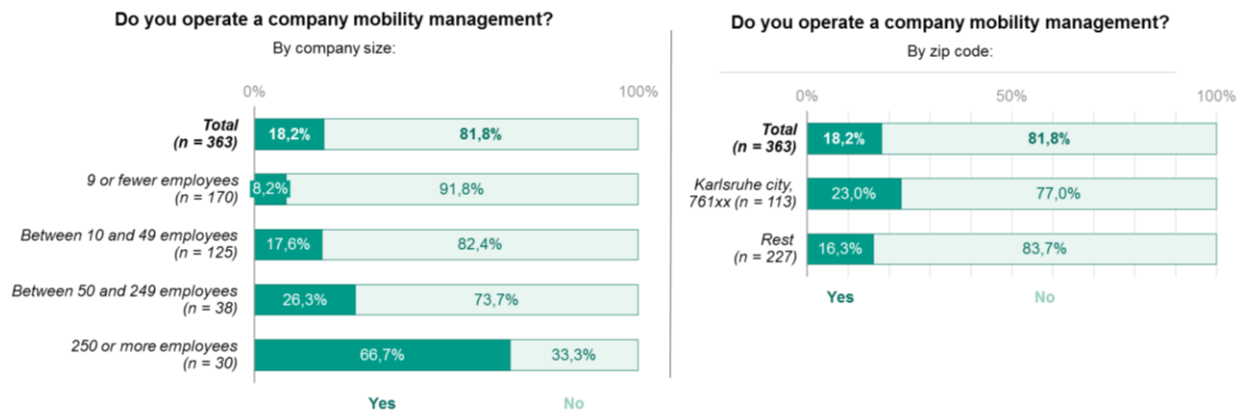


Figure 2: Return of questionnaires by company size (left) and regional distribution (right)

Concerning the implemented measures shown in figure 3, the electrification of corporate fleets is one of the most important measures, implemented by over 40 % of the companies operating a CMM. Only measures from the category "bicycle" are more often implemented. A full list of measure implemented can be found in the Annex.

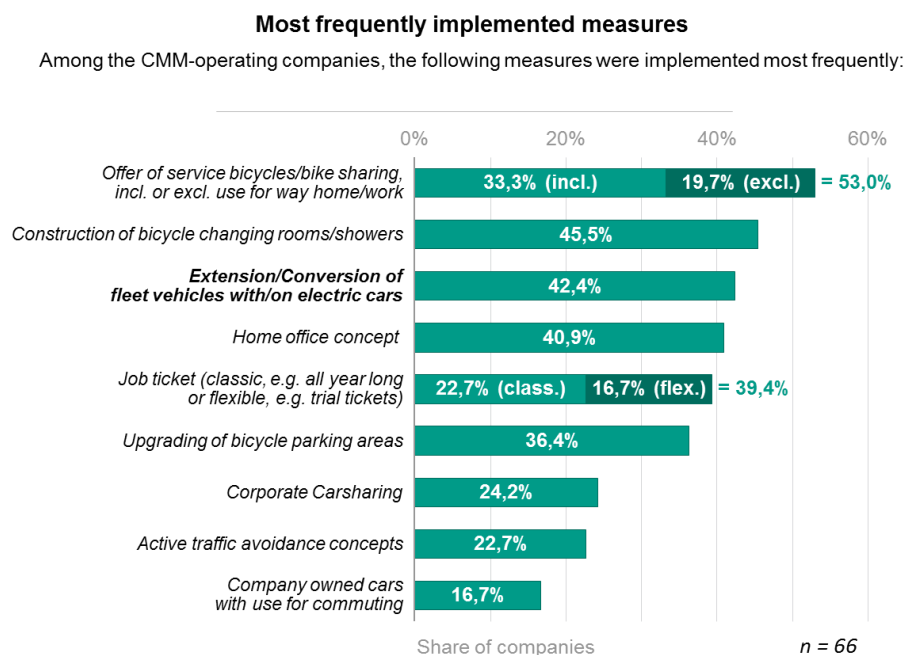


Figure 3: Survey results for implemented measures

Considering the reason, why companies are introducing a CMM, the survey and the accompanying interviews show that a CMM primarily fulfils social objectives: In particular, increased employee satisfaction was observed (see Figure 4).

What are the goals of company mobility management?

Among CMM-operating companies the following goals are pursued:

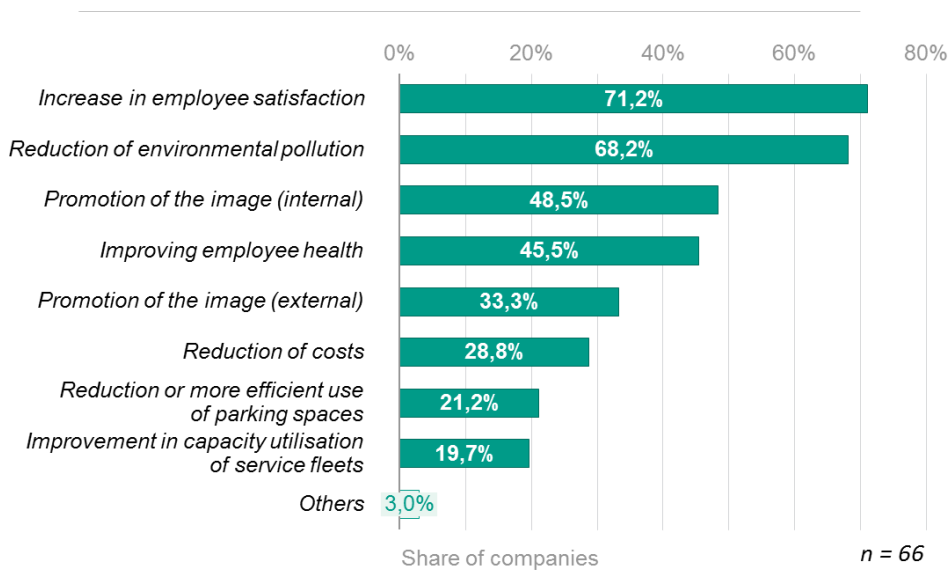


Figure 4: Survey results for pursued goals

In cases where a CMM is actively communicated to the outside world, a more positive public perception of the company is reported. In addition, electric mobility measures are positively highlighted, interest in and utilisation of the vehicles is high, although initial scepticism or lack of knowledge about the use of EVs was reported.

Why is no corporate mobility management implemented?

Among the non-practising companies the following obstacles were mentioned:

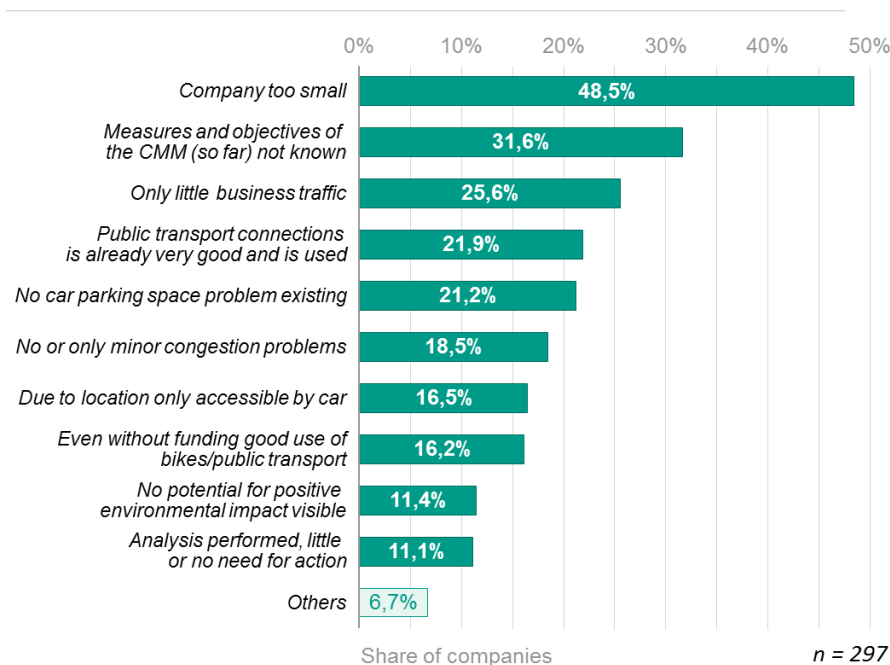


Figure 5: Reasons against corporate mobility management

In addition to the companies already operating a CMM, those that have not yet implemented a CMM were also surveyed. In particular, the question of the obstacles and reasons why a CMM is not being implemented was of special importance. What are the reasons against a BMM, why is there no need for action? The free answers add an additional obstacle to the given catalogue of reasons: "Due to the situation, companies can only be reached by car". However, other reasons are decisive; the most frequently mentioned are shown in Figure 5.

The most common answer "company too small" was thereby chosen by 70.1% of micro enterprises, but also by 27.8% of small and - occasionally, with 2.1% - also by medium-sized enterprises

A total of 50.5% of the group that does not operate a CMM does not plan to implement BMM measures in the future either, while 49.5% have already discussed the implementation of at least one measure or have planned to implement it ("Potential group"). The most frequent measures are listed in Figure 6. Leading the list is, as with the implemented measures of the CMM-operating group. The electrification of the vehicle fleet and the home office concept are also in the front ranks, as with the implemented measures. Less popular in direct comparison are the bicycle changing rooms/showers. The least considered measures are similar in composition to the measures implemented.

Most frequently named potential measures

Among the non-practising enterprises that consider at least one measure possible or have planned at least one measure, the following measures were mentioned most frequently:

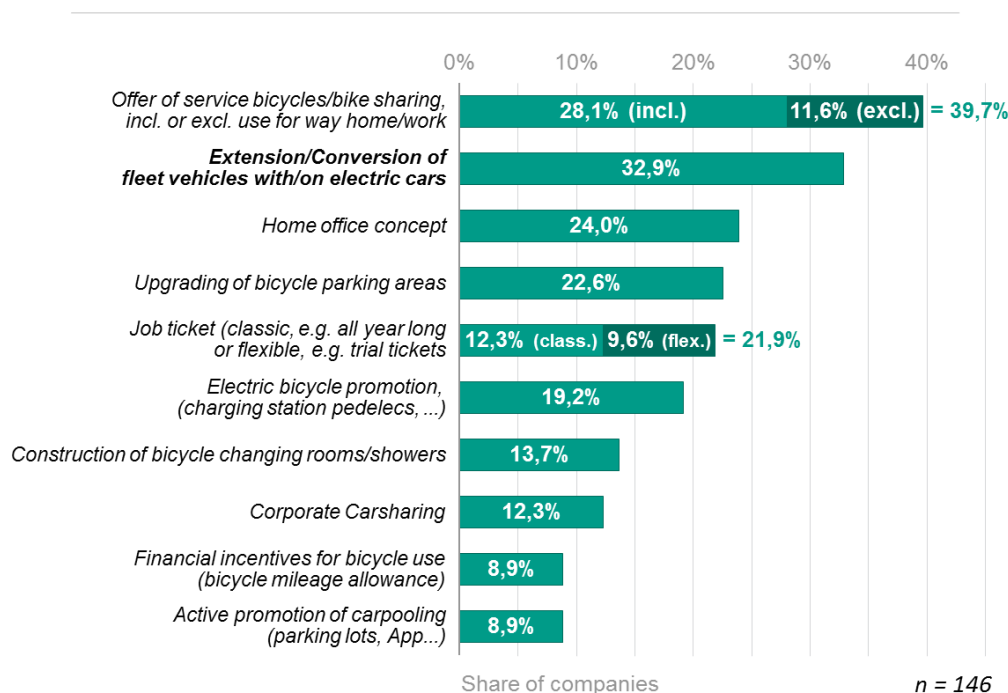


Figure 6: Potentials of measures in companies that do not operate a CMM

4 Discussion and conclusions

Since this paper focuses only on one important region in Germany, the results may vary for others depending on the given industry structure. However, the survey and interviews provide new and relevant insights into the role of CMM and electric vehicles as one of the most important measures, and although the results may not be considered as representative for other regions, they may be an indication for the diffusion and role of CMM and electric mobility as a concrete measure.

The investigation of the distribution and potentials of a CMM in the technology region of Karlsruhe leads to the following key findings

- Of a total of 363 companies in the online survey, 66 companies, or 18.2 %, operate a CMM.
- Among small or even smallest companies the CMM is applied in less than every fifth or every eleventh enterprise. Among medium-sized enterprises, it is already used in one in four, and among large enterprises in as many as two out of three. There is thus a clear correlation between size and CMM diffusion;
- On average, 4.2 measures are carried out per CMM operating company. The most important measures are the use of company bicycles and the provision of changing rooms followed by the introduction of electric vehicles, which still accounts for more than 40%.
- Two goals seem to have top priority for CMM companies: 71.2% of companies want to increase employee satisfaction and 68.2% want to reduce environmental pollution. The (primarily internal) image and the health of the employees also play a role. The most important goals are therefore of a social and ecological nature. Economic goals, on the other hand, such as lower costs or increased efficiency, are of secondary importance, although not irrelevant.
- Companies that do not operate a CMM are usually justifying this by the size of their company. Almost every third company without a BMM does not know the measures and goals of the BMM either. About a quarter explain their position with the low business volume. And around 20 percent state that there is no need for action due to the lack of traffic jams, parking or connection problems of public transport.
- Overall, apart from their size, there is therefore no dominant reason why the BMM is not applied to these companies. In summary, company size, lack of knowledge or lack of incentives in the form of mobility-related problems speak against the introduction of a BMM. However, almost every second of the companies with currently no CMM sees potential in it and could introduce an average of 2.6 measures in the future. Here, too, company bicycles are again the most frequently mentioned individual measure, this time directly followed by fleet extension/conversion to electric cars.

To summarize: The introduction of a CMM has a positive effect on the diffusion of electric vehicles in two different ways: Firstly, through the direct purchase of electric vehicles in companies (service fleets account for almost 65% of new registrations in Germany). On the other hand, by reducing existing scepticism, the CMM can act as a catalyst for the diffusion of electric vehicles in the private sector. Thus, the CMM can make a significant contribution to the diffusion of electric vehicles.

Acknowledgment

This publication was written in the framework of the Profilregion Mobilitätssysteme Karlsruhe, which is funded by the Ministry of Economic Affairs, Labour and Housing in Baden-Württemberg and as a national High Performance Center by the Fraunhofer-Gesellschaft.

References

- [1] Federal Environmental Agency (UBA) (2018): *Klimabilanz 2017: Emissionen gehen leicht zurück*. Dessau-Roßlau.
- [2] Federal Environmental Agency (UBA) (2012): *Daten zum Verkehr*. Ausgabe 2012. Dessau-Roßlau.
- [3] Federal Environmental Agency (UBA) (2018): *Klimabilanz 2017: Emissionen gehen leicht zurück*. Dessau-Roßlau.
- [4] Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) (2016): *Klimaschutzplan 2050. Klimaschutzpolitische Grundsätze und Ziele der Bundesregierung*. Berlin.
- [5] Federal Motor Transport Authority (2018): *Fahrzeugzulassungen (FZ): Neuzulassungen von Kraftfahrzeugen und Kraftfahrzeuganhängern nach Haltern, Wirtschaftszweigen: Jahr 2017: FZ 24*. Flensburg.

- [6] Müller, Guido (2001): *Betriebliches Mobilitätsmanagement: Status Quo einer Innovation in Deutschland und Europa*. City of Munich, Department of Labour and Economic Affairs. Munich.
- [7] Gillessen, Volker (2015): *Neue Mobilität für Unternehmen: Empfehlungen zum Einsatz von Elektrofahrzeugen*. Thüringer Energie- und GreenTech-Agentur (ThEGA), State Development Corporation of Thuringia (LEG Thüringen). Erfurt.
- [8] Vogt, Walter; Fiegl, Christian (2012): *Gute Argumente für betriebliche Radverkehrsförderung in Wirtschaft und öffentlicher Verwaltung Baden-Württemberg*. Ministry of Finance Baden-Württemberg. Stuttgart.
- [9] Bruns, Hans-Ludwig; Vennefrohne, Klaus; Welk, Lars (2007): *Mobilitätsmanagement in der betrieblichen Praxis*. Employers' Liability Insurance Association for Medical Services and Welfare Work (BGW). Hamburg

Authors



Steven Kulawik completed his undergraduate studies (B.Sc.) of Industrial Engineering and Management at Karlsruhe Institute of Technology (KIT). He is currently pursuing his master's degree in this same subject, focusing on industrial production and SCM.



Dr. Tim Hettesheimer studied General Engineering at the Technical University Kaiserslautern and at Karlsruhe Institute of Technology (KIT). From 2010 to 2015, he worked as a researcher at the Fraunhofer Institute for Systems and Innovation Research in the Competence Center Industrial and Service Innovations. Since May 2015 in the Competence Center Energy Technology and Energy Systems. He received his PhD from KIT in 2016. His current research focuses on the diffusion of electromobility and lithium-ion batteries.



Dr. Simon Árpád Funke is a Senior Scientist at the Competence Center Energy Technology and Energy Systems at the Fraunhofer Institute for Systems and Innovation Research in Karlsruhe, Germany. He received his PhD from University of Kassel, Germany, for his research on the range of battery electric vehicles. Areas of work are the technology and usage patterns of alternative drive systems.