

Electromobility in Carsharing – Status quo, potentials, factors of success

Results of a research project conducted within the scope of the program „Modellregionen Elektromobilität“

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„Modellregionen Elektromobilität“ and the brochure „Elektromobilität im Carsharing - Status Quo, Potenziale und Erfolgsfaktoren“

In order to reduce CO2 and particulate matter emissions, electromobility using regeneratively produced electricity is a key instrument of the German government. Therefore, the German Federal Ministry of Transport has started the program „Modellregionen Elektromobilität“ in 2009. In this program, the ministry subsidises a number of projects within several model regions in Germany in which the use of electric cars is tested. The goal is to test and to subsequently establish the use of electric cars in order to have 1 million

electric cars on Germany's roads by 2020. On behalf of the German Federal Ministry of Transport, the research group City-Mobility-Energy of the Erfurt University of Applied Sciences and the University of Stuttgart has conducted the accompanying research in the „Modellregionen Elektromobilität“ thematic field of fleet management.

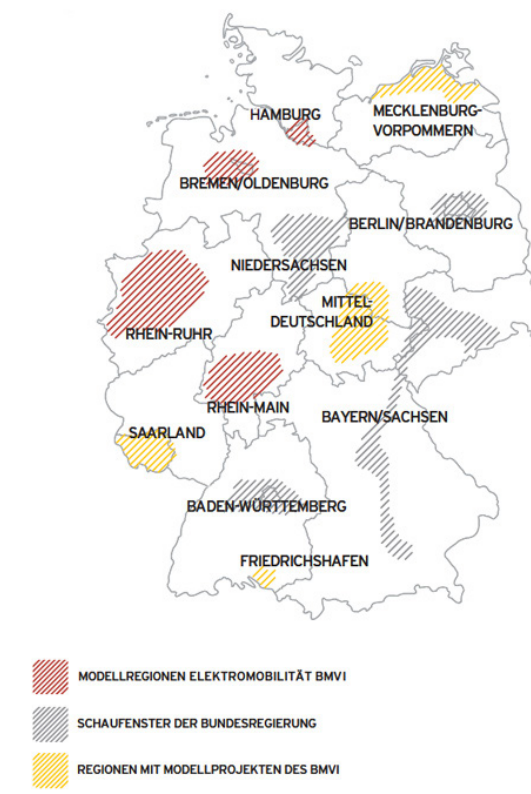
On the base of this research work, an extensive 200-page brochure about the status quo, the potentials and the fac-

tors of success of electromobility in carsharing systems was published in march 2016.

The publication aims at all stakeholders of carsharing systems, like OEMs, private and corporate customers, investors and especially carsharing providers and public institutions like municipal administrations and decision makers.

Left: Overview of the German electromobility model regions. Over 130 electromobility projects have been conducted in those regions.

Right: The brochure „Elektromobilität im Carsharing - Status Quo, Potenziale und Erfolgsfaktoren“ gives an insight into the results from e-carsharing projects from the model regions and an overview of the status quo, the potentials and factors of success of (e-)carsharing in Germany in general.



Study Design



A symposium, a workshop, numerous expert interviews and an extensive research about the status quo of carsharing in general and e-carsharing in particular were conducted. Several social science methods like the World Café workshop method and the method of guided expert interviews were used.

Data research
In 2015, a detailed inventory of the current (E-)carsharing providers in Germany was conducted. In a first step, carsharing studies and statistics were

used to define the categories for the collection of further data. Subsequently, the data was gathered by research in literature and internet as well as by targeted personal inquiries amongst the carsharing providers.

Guided interviews
The interviews were conducted with 16 representatives of (e-)carsharing providers, projects and corporate carsharing (companies) as well as with 6 representatives from municipalities. They were selected based on the results

of the data research. **Symposium and workshop**
The symposium was held in July 2015 with over 30 participants from research, representatives of carsharing providers, associations, car manufacturers and project management centers of the model regions. Subsequently, an expert workshop was held in which the factors of success and possible business models for e-carsharing systems were discussed.

Results

Potentials of (e-)carsharing

The potentials of (e-)carsharing from society's and from the municipalities' point of view can be divided into...
- general potentials
- potentials with particular importance for cities
- potentials with particular importance for rural areas.

General potentials of (e-)carsharing are for example the reduction of the overall number of cars, the change of mobility routines and the dismantling of existing reservations towards the use of electric cars.

Among the potentials with specific importance for cities is the complement e-carsharing could represent for public transport although some studies show that under certain circumstances, carsharing can also cannibalise public transport to some extent. The reduction of parking space needed and the reduction of local emissions represent central potentials of carsharing as well and are closely linked to the reduction of the overall number of cars.

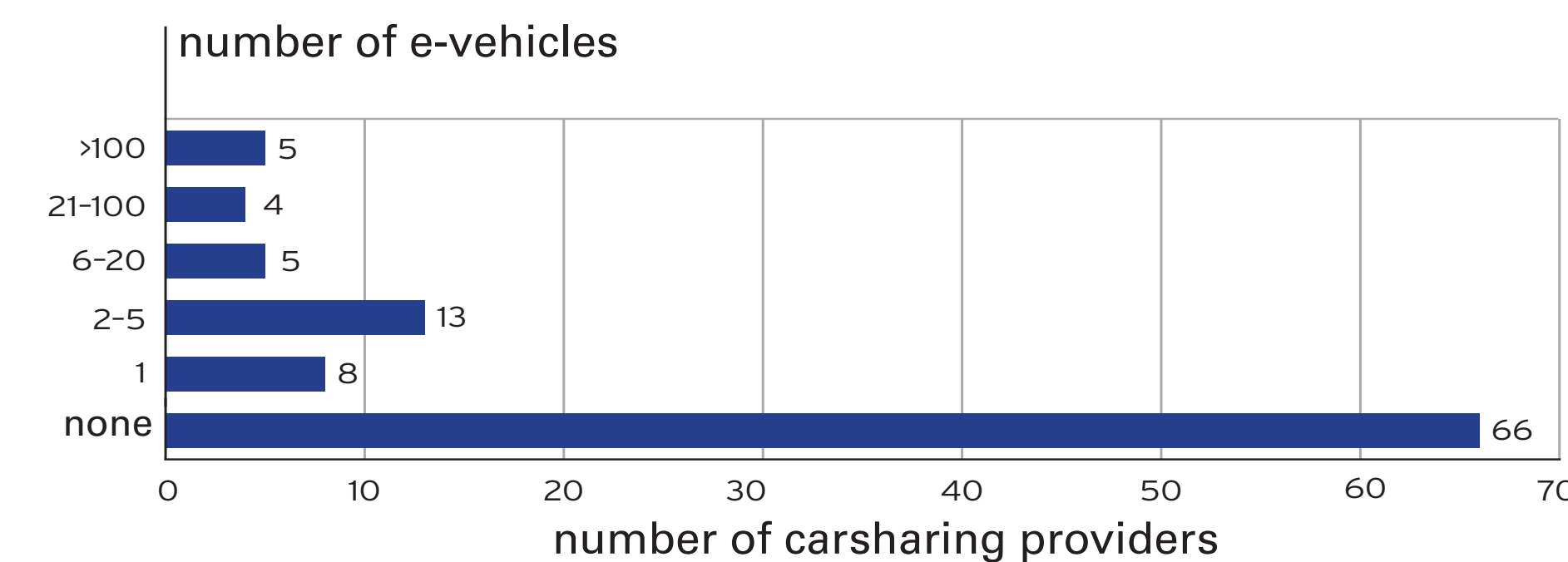


Especially in rural areas, e-carsharing has a high potential to contribute to local smart grids with locally produced, regenerative energy and electric vehicles using this energy and serving as a reservoir for electricity while not being used.

Source	Geographical reference	Station based/ free floating	Passenger car reduction quota (1 carsharing vehicle replaces X private passenger cars)
Bundesverband Carsharing e.V.	Germany	station based	1:4 - 1:10
City of Bremen	cambio business area	station based	1:15
Shaheen & Cohen	Australia	station based	1:7 - 1:10
Martin et al.	North America	station based	1:9 - 1:13
6-t bureau de recherche	Paris	free floating	1:3
6-t bureau de recherche	Paris	station based	1:6
team red GmbH	Munich	free floating	1:2,0 - 1:3,6
City of Amsterdam	Amsterdam	free floating	1:1

The description of the status quo of (e-)carsharing (section 4 of the publication) starts with a stakeholder overview (see graph at right): next to the carsharing companies and stakeholders like corporate and private customers, OEMs and other suppliers, new service providers like the providers of intermodal booking platforms become increasingly important – for the transport market in general and especially for carsharing systems, because those carsharing systems rely on being linked with other modes of transport. Cooperation partners from fields like public transport play a key role for carsharing companies in order to establish profitable business models as well.

Based on the data research, a systematology for the classification of (e-)carsharing systems was developed (see section 4.2 of the publication). Currently, carsharing systems are normally divided into station based systems on the one hand and free floating systems on the other hand. The systematisation of (e-)carsharing systems shows, that next to this main criterion of differentiation, (e-)carsharing systems can be characterised by various other criteria as well, f.e. by the extension and structure of the region where they are offered (city vs. rural areas) or by the question if it's a classic (e-)carsharing company or if next to open user group carsharing



Current (e-)carsharing systems and actors

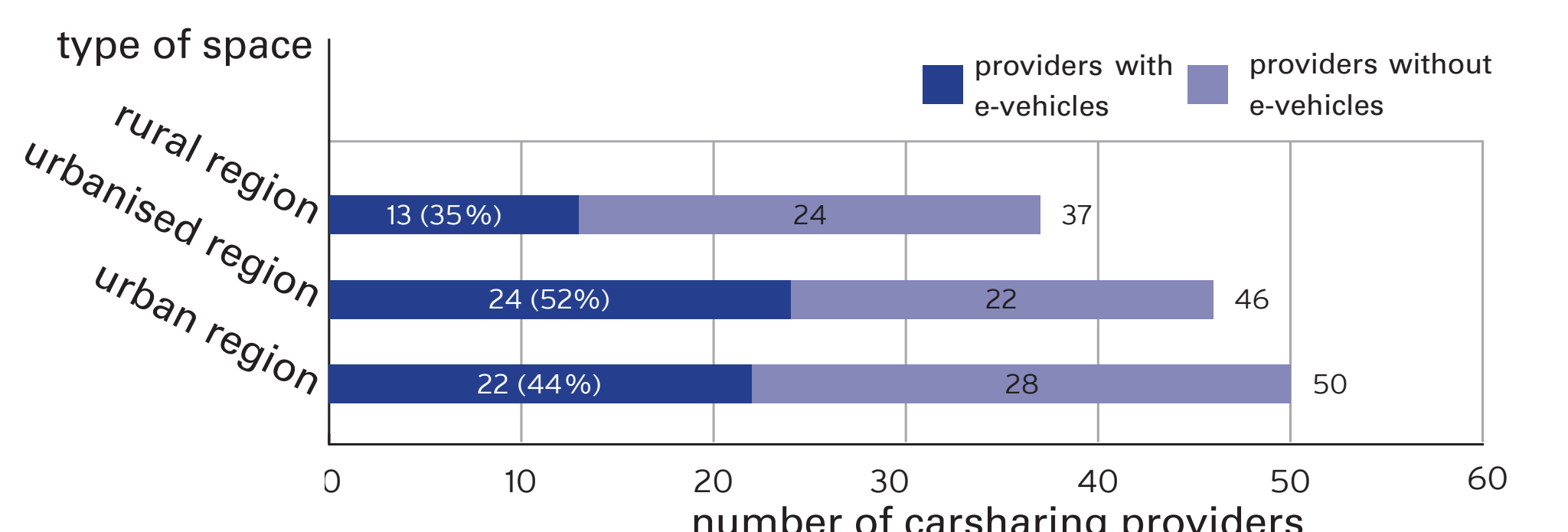
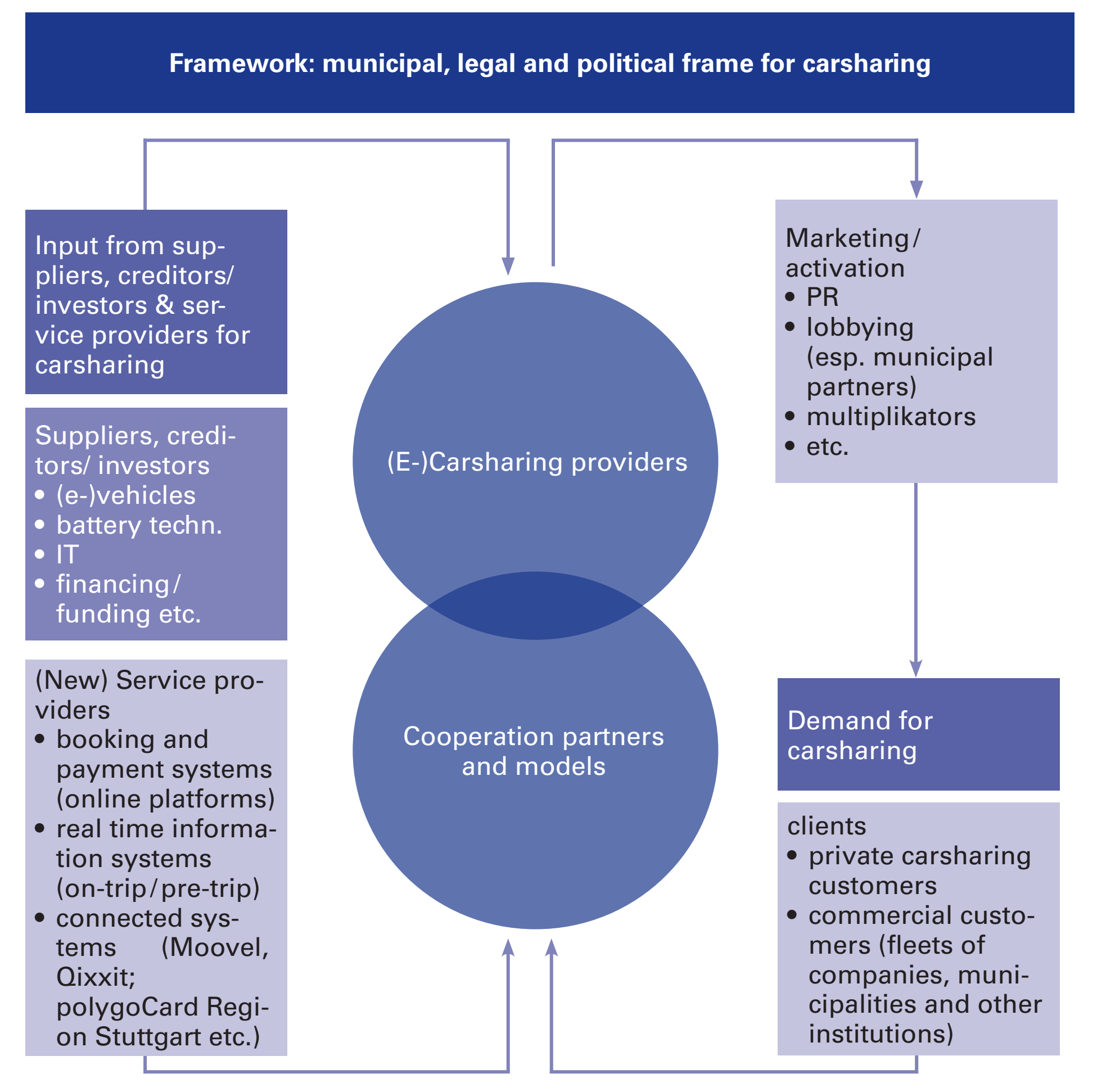
there are also offers with limited access like corporate carsharing.

On the key date of the 1st of January 2015, 150 providers of station based carsharing and four providers of free floating Carsharing were offering their carsharing schemes in Germany. Since the beginnings of carsharing in the 1990s, a significant professionalization has taken place in the carsharing branch as the high increase of the number of the capital companies among the carsharing providers shows. About one third of the carsharing providers offer electric vehicles. The bigger the fleet of a provider is, the higher as well the percentage of electric vehicles is. The share of the providers who offer electric vehicles is higher in cities or urbanised areas than in rural areas. Mostly, e-carsharing providers are offering their services locally or regionally. Only few bigger providers offer their carsharing system trans-regionally or even nationwide or in several countries.

Bottom left: number of e-vehicles by number and size of the carsharing providers in Germany.

Bottom right: number of carsharing providers with and without e-vehicles by area type (rural, urbanised, urban)

Right: (e-)carsharing stakeholder graph



Guidance for the road to profitability

Based on the guided interviews with representatives of (e-)carsharing providers, private (e-)carsharing initiatives, municipalities and companies which use corporate carsharing, the factors for success and possible obstacles for electromobility in carsharing systems were identified (see section 5.1 in the publication).

Then, those factors of success and possible obstacles were assigned to the thematic aspects "organisation", "marketing", "location" and "charging infrastructure and vehicles". In each of those aspects, the factors of success and possible obstacles were divided into internal and external factors: The internal factors are factors which can be directly influenced by the (e-)carsharing providers themselves whereas the external factors are underlying conditions like the legal situation or the attitude of society towards (e-)carsharing (see table at right).

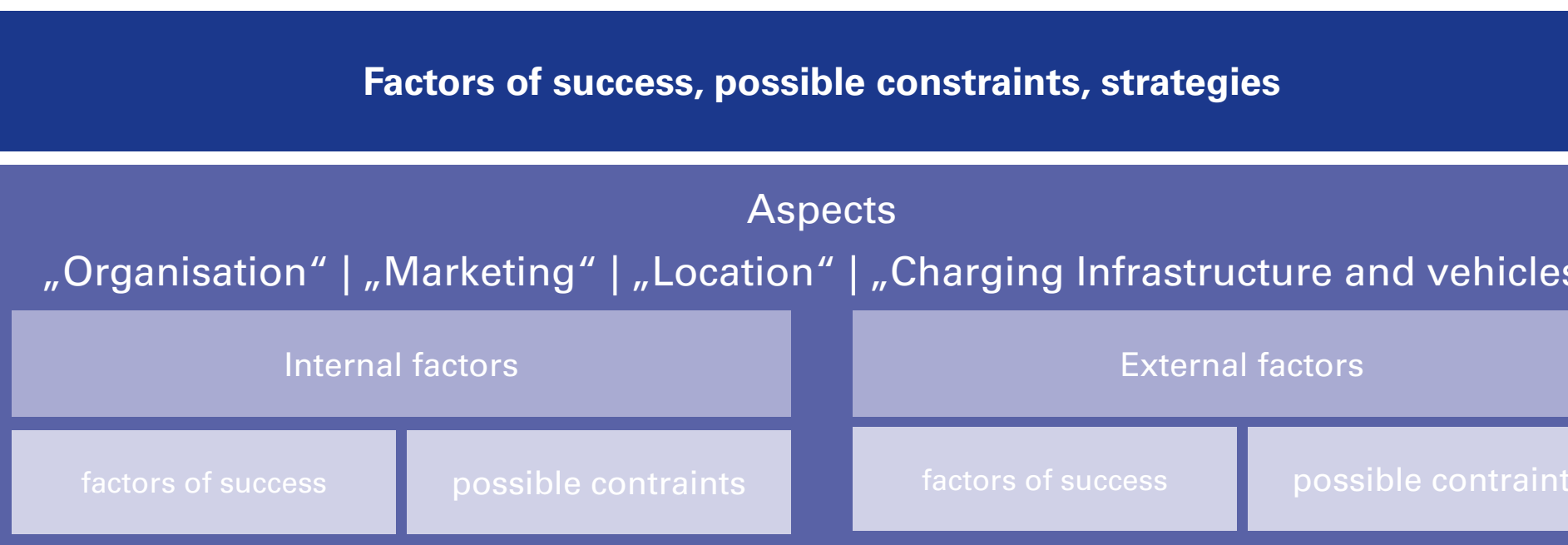
In section 5.2 of the publication, all relevant hard factors of revenue and expense of (e-)carsharing systems

are listed in a calculation of profitability table which aims at giving (e-)carsharing stakeholders a quick overview over the profitability of (e-)carsharing systems (see exemplary thumbnail tables at right). The revenue consists of factors like user fees and effects of synergies with other (e-)carsharing providers whereas expenses include procurement costs, fixed costs (f.e. for staff), mixed costs (f.e. for battery rent for electric vehicles) and variable costs (f.e. for fuel). Shortly, this table would be made accessible as an online tool as well.

Top left: Exemplary thumbnails of the profitability table from chapter 5.2 of the publication. All relevant revenue and expense factors of (e-)carsharing systems are listed in this table.

Bottom left: Systematology of the „Factors of success, possible constraints and strategies“ table in chapter 5.1 of the publication.

Right: Exemplary excerpt from the table „organisation“



Aspect: Organisation (extract)	
Internal factors	
Internal factors of success	create offers for different user groups in order to reach a more leveled vehicle occupancy in the course of time (f.e. on workdays at daytime and in the evening, on the weekends) (common: one third corporate customers, two thirds private customers) ... (more factors: see publication)
Possible constraints	e-vehicles: higher transaction costs/operative costs than for conventional vehicles; f.e. partly increased costs by the necessity of bringing the vehicles to the charging spots ... (more factors: see publication)
External Factors	
External factors of success	privileges for e-vehicles, f.e. "Blauer Engel" according to RAL-UZ 100 b (but also legal framework etc.) ... (more factors: see publication)
Possible external constraints	high level of private car ownership in Germany 2014: 77% of all households owned 1 or more cars; 105 cars per 100 households (see: German Federal Statistical Office 2015: 172); Availability of private cars higher the more rural the region (see German Federal Statistical Office 2013b) ... (more factors: see publication)

The publication is available for download in German language at <https://www.now-gmbh.de/> (<https://www.now-gmbh.de/de/service/publikationen>)