

# E-MOB: FOSTERING E-MOBILITY BY SUPPORTING TAXI ELECTRIFICATION



5/4/2022

Aufbauwerk Region Leipzig GmbH

Based on the outputs of the Interreg Europe project [E-Mob](#) (Integrated actions towards enhanced e-mobility in European Regions) we implement the following action addressing the Measures and Implementation Concept "Leipzig - City for Intelligent Mobility".

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## ADDRESSED POLICY INSTRUMENT

The Aufbauwerk Region Leipzig GmbH (Aufbauwerk) addresses the *Measures and Implementation Concept "Leipzig - City for Intelligent Mobility"*.

The policy was developed in 2017 to transform Leipzig towards a leading city of intelligent mobility (post fossil) in Germany. It includes a wide range of concrete measures which should be implemented to reach this target. Each defined measure includes the description, objectives, initiator, responsibilities, partners, scheduling, financing and costs. The policy will be improved 2022 to an update due to fast changing framework/market conditions (e.g. technological development of charging infrastructure and legislation).

## INTRODUCTION

E-MOB stands for Integrated actions towards enhanced e-mobility in European Regions and aims at enhancing e-mobility solutions in regional passenger transport systems through coordinated policy learning and planning. As part of the E-MOB project, policy instruments are being further developed to improve electromobility and sustainable mobility planning in various European regions. Under the consortium leadership of Aufbauwerk Region Leipzig GmbH, nine partners of the E-MOB project represent 8 European regions at different stages of e-mobility development, but they all share the view that e-mobility represents the future of mobility: a clean, quiet, advanced technology, combined with power, speed and lots of fun. E-mobility has a great potential to improve our environment. Cars, trains and planes account for a quarter of global energy consumption and approximately the same proportion of emissions. That is a heavy load – but at the same also a unique chance to limit our impact on the climate. The project aims to support the implementation of the policies of participating regions through the exchange of experiences and the sharing of practices between actors of regional relevance with the specific objective of preparing the integration of lessons learned into regional policies and actions.

The concept "Leipzig - City for Intelligent Mobility" adopted in 2017 represents this policy instrument for Leipzig and will be updated this year. The update of the measures and implementation concept is being carried out as part of the E-MOB project. The aim of updating the concept "Leipzig - City of Intelligent Mobility" is to identify ideas and approaches for new mobility projects that offer both economic support for (potential) Leipzig companies and added value for the mobility and quality of life of the city's citizens and guests.

### Regional background

The population of cities in Europe is increasing. This trend holds true for the three biggest Saxon cities Chemnitz, Dresden and Leipzig, too. However, it is the opposite for the other regions, on average. For Leipzig, the number of inhabitants increased from 551,871 in 2014 to 597 493 in 2020 (as of each year's 31.12.<sup>1</sup>). Speaking in relative terms, this is an increase of about 8.1%. In comparison, the number of inhabitants in Germany increased from 81.198mio. in 2014 to 83.155mio. in 2020. This is an increase of

<sup>1</sup> <https://statistik.leipzig.de/statcity/table.aspx?cat=2&rub=4&per=q> (retrieved on 21.04.2022)

about 2.41%<sup>2</sup>. These expectations give the City of Leipzig a special role in the state of Saxony and the region of central Germany. Leipzig and the surrounding region consequently become a pioneer example when addressing the selected policy instrument within this action plan.

Based on estimations from 2015, the predicted population development for the city of Leipzig until 2030 forecasts a population of about 680,000 inhabitants in the pessimistic scenario and 750,000 inhabitants in the optimistic scenario. With reference to the forecasted base case of 720,000 inhabitants, Leipzig will face an increase in its population of 30.5% from 2014 to 2030. In comparison, the predicted population development for Germany until 2030 forecasts a population of about 83.008mio. inhabitants in the pessimistic scenario and 84.422 inhabitants in the optimistic scenario. For the optimistic scenario, that will be an increase in Germany's population of 3.9%.<sup>34</sup>

The population development in Leipzig strongly differs for certain age groups. The most rapid growing age group is the one of the elderlies (90 years and older). Forecasts estimate an increase in 130% from 2015 to 2030. The second most rapid growing age group is the one of children of school age (6 to under 15 years) for which an increase of 60% from 2015 to 2030 is predicted. An increase above average is also predicted for the number of pre-school children (under 6 years of age) for which an increase of 35% from 2015 to 2030 is expected. On a regional level, the population development in Leipzig and its surrounding strongly differs, too. While the communities in the immediate vicinity of Leipzig are growing, a further decline in population is occurring in the more distant communities.<sup>5</sup>

As there is such an expected increase in population, the number of jobs in Leipzig is expected to increase significantly, too. However, this number of jobs is expected to grow less strongly than the number of inhabitants. This is forecasted for the number of employed people living in the city as well. Conversely, the number of jobs in the outlying areas of the city will not decline at the same rate as the number of inhabitants and employees. Some of these jobs will therefore be taken up by employees from the city of Leipzig. In the immediate vicinity of Leipzig, increasing numbers of jobs are expected, too.<sup>6</sup> Thus, there will be an increase in commuting people.

The expected structural and economic development will lead to a significant increase in road traffic in Leipzig. This applies to both passenger traffic and commercial traffic. Thus, the number of vehicles in Leipzig is rising continuously, too. In 2017, there were 255,091 vehicles registered. Of these vehicles, 223,733 were passenger cars, of which 88.6% were private cars. So, private passenger cars account for 77% of all the registered cars. Out of the passenger cars, there were only 0.1% electric cars. The passenger car density in general at the end of 2017 was around 379 cars per 1,000 inhabitants.<sup>7</sup> Referring not to cars

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<sup>2</sup> <https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Bevoelkerung/Bevoelkerungsstand/Tabellen/liste-gebietstand.html> (retrieved on 21.04.2022)

<sup>3</sup> [https://static.leipzig.de/fileadmin/mediendatenbank/leipzig-de/Stadt/02.1\\_Dez1\\_Allgemeine\\_Verwaltung/12\\_Statistik\\_und\\_Wahlen/Stadtforschung/Bevoelkerungsvorausschaetzung\\_2016.pdf](https://static.leipzig.de/fileadmin/mediendatenbank/leipzig-de/Stadt/02.1_Dez1_Allgemeine_Verwaltung/12_Statistik_und_Wahlen/Stadtforschung/Bevoelkerungsvorausschaetzung_2016.pdf), p. 14 (retrieved on 21.04.2022)

<sup>4</sup> [https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Bevoelkerung/Bevoelkerungsvorausberechnung/Publikationen/Downloads-Vorausberechnung/bevoelkerung-deutschland-2060-5124202199014.pdf?\\_\\_blob=publicationFile](https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Bevoelkerung/Bevoelkerungsvorausberechnung/Publikationen/Downloads-Vorausberechnung/bevoelkerung-deutschland-2060-5124202199014.pdf?__blob=publicationFile); p. 9, 16 (retrieved on 21.04.2022)

<sup>5</sup> Ibid. p. 17, 21

<sup>6</sup> Industrie- und Handelskammer zu Leipzig. (2017). Studie zur Organisation des Stadtverkehrs in Leipzig unter besonderer Beachtung des Wirtschaftsverkehrs. p.6

<sup>7</sup> [https://static.leipzig.de/fileadmin/mediendatenbank/leipzig-de/Stadt/02.1\\_Dez1\\_Allgemeine\\_Verwaltung/12\\_Statistik\\_und\\_Wahlen/Statistik/Statistisches\\_Jahrbuch\\_Leipzig\\_2018.pdf](https://static.leipzig.de/fileadmin/mediendatenbank/leipzig-de/Stadt/02.1_Dez1_Allgemeine_Verwaltung/12_Statistik_und_Wahlen/Statistik/Statistisches_Jahrbuch_Leipzig_2018.pdf) p. 157 (retrieved on 21.04.2022)

but to traffic, private passenger traffic accounts for 69% of the overall traffic whereas commercial traffic accounts for 31%.<sup>8</sup>

Accounting all types of mobility in a modal split, the car is the most frequently used means of transport. 38% of Leipzig's inhabitants used motorized individual traffic in 2017, followed by walking and cycling with 38% and public transport with 24%.<sup>9</sup> So, the modal split for 2017 is roughly 60 to 40 when contrasting walking, cycling and public transport (summed up to environmental alliance) against motorized individual traffic. By 2025, the modal split is aimed at 70 to 30 according to Leipzig's urban development plan. According to this plan, the 70% should be composed of 27% foot traffic, 20% cycling and 23% public transport.<sup>10</sup> Reducing motorized individual traffic is relevant, because CO<sub>2</sub>-emissions caused by this type of traffic have been increasing since 1990 up to a maximum of 36% in 2011 (no more recent data available)<sup>11</sup>.

Since going to work with a motorized vehicle is a habit for 45% of the commuters (2017), traffic has been increasing and will increase accordingly.<sup>12</sup> However, motorized traffic could be reduced by using more non-motorized vehicles such as bicycles because 50% (2015) of the work-related commuting distances in Leipzig are shorter than 5km.<sup>13</sup> So, using more often non-motorized vehicles seems reasonable for people working and living in the city of Leipzig. Likewise, seems reasonable for incoming and outgoing commuters too since most of the distances in the city of Leipzig between place of living, station for public transport or place of work are less than 5km, too. Usually, the bottleneck is the way outside the city of Leipzig, so either for incoming commuters from their place of living to the next station of public transport or for outgoing commuters from the station to the place of work.

The goal of future mobility in Leipzig must therefore be to encourage people to switch to climate-friendly transport routes.

## STATE OF THE ART

The city of Leipzig has been very active in the field of electric mobility for years. This is reflected both in the commitment of fleet operators in the procurement of e-vehicles and in the development of the publicly accessible charging infrastructure that has taken place so far. Three market ramp-up scenarios are being developed for a broad market launch that is now imminent.

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<sup>8</sup> Industrie- und Handelskammer zu Leipzig. (2017). Studie zur Organisation des Stadtverkehrs in Leipzig unter besonderer Beachtung des Wirtschaftsverkehrs. p.3

<sup>9</sup> [https://static.leipzig.de/fileadmin/mediendatenbank/leipzig-de/Stadt/02.1\\_Dez1\\_Allgemeine\\_Verwaltung/12\\_Statistik\\_und\\_Wahlen/Statistik/Statistisches\\_Jahrbuch\\_Leipzig\\_2018.pdf](https://static.leipzig.de/fileadmin/mediendatenbank/leipzig-de/Stadt/02.1_Dez1_Allgemeine_Verwaltung/12_Statistik_und_Wahlen/Statistik/Statistisches_Jahrbuch_Leipzig_2018.pdf) p. 160 (retrieved on 21.04.2022)

<sup>10</sup> Stadt Leipzig. (2016). Maßnahmen- und Umsetzungskonzept „Leipzig – Stadt für intelligente Mobilität“. Retrieved from Maßnahmen- und Umsetzungskonzept. P.25

<sup>11</sup> <https://www.leipzig.de/umwelt-und-verkehr/energie-und-klima/energie-und-klimaschutzprozess-eea/klimabilanz-fuer-leipzig/> (retrieved on 21.04.2022)

<sup>12</sup> [https://static.leipzig.de/fileadmin/mediendatenbank/leipzig-de/Stadt/02.1\\_Dez1\\_Allgemeine\\_Verwaltung/12\\_Statistik\\_und\\_Wahlen/Statistik/Statistisches\\_Jahrbuch\\_Leipzig\\_2018.pdf](https://static.leipzig.de/fileadmin/mediendatenbank/leipzig-de/Stadt/02.1_Dez1_Allgemeine_Verwaltung/12_Statistik_und_Wahlen/Statistik/Statistisches_Jahrbuch_Leipzig_2018.pdf) p. 160 (retrieved on 21.04.2022)

<sup>13</sup> [https://static.leipzig.de/fileadmin/mediendatenbank/leipzig-de/Stadt/02.6\\_Dez6\\_Stadtentwicklung\\_Bau/66\\_Verkehr\\_und\\_Tiefbauamt/StEP/StEP\\_Verkehr.pdf](https://static.leipzig.de/fileadmin/mediendatenbank/leipzig-de/Stadt/02.6_Dez6_Stadtentwicklung_Bau/66_Verkehr_und_Tiefbauamt/StEP/StEP_Verkehr.pdf) p. 8 (retrieved on 21.04.2022)

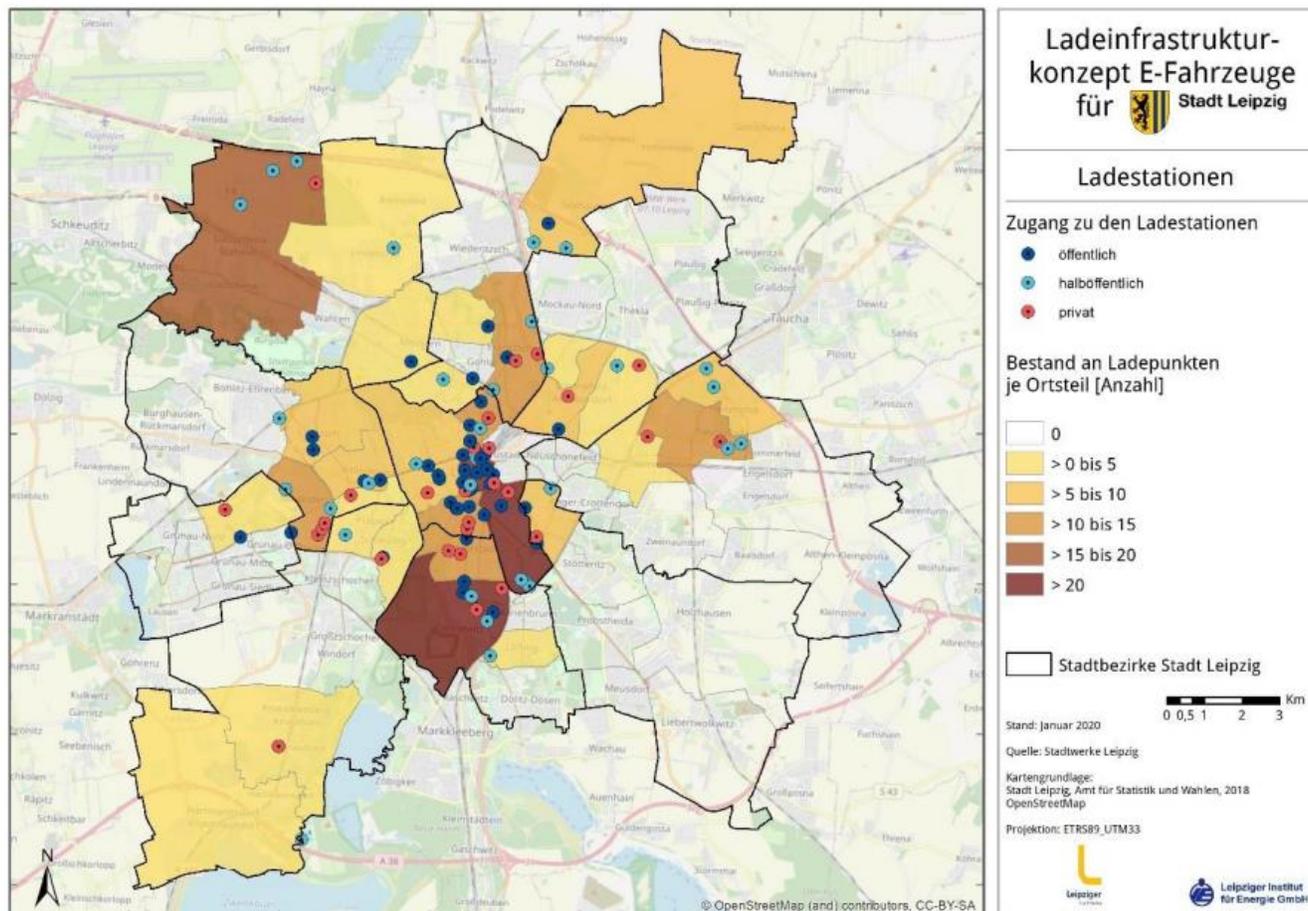
The city of Leipzig has been active in the field of e-mobility for many years. The following is a brief overview of the most important milestones. A detailed description of the activities to date in the form of offers and services, research programmes and projects, organisations, cooperation and events as well as municipal programmes and plans for the implementation of electromobility in Leipzig was provided in the holistic mobility concept "Leipzig - City for Intelligent Mobility" and the associated measures and implementation concept. The most important activities in the field of electromobility in the city of Leipzig include:

- The cluster policy, because electromobility is a focus of work in the energy and environmental technology cluster. It is based on the cluster strategy of the city of Leipzig. A cluster network and the Netzwerk Energie & Umwelt e. V. (Energy & Environment Network) were established for the strategic implementation of this goal. In addition to the Leipzig Economic Development Agency, cluster members are regional small, medium-sized and large companies as well as leading research institutes from the energy sector.
- Leipzig became the official lead region for electromobility as early as 2012.
- Since 2013, Leipzig has been an industrial location for the production of e-vehicles.
- Since 2014, the annual electric mobility rally "lipsia-e-motion" has taken place.
- In 2015, a survey of 500 companies was conducted by the Office of Economic Development in order to promote e-mobility in various fields and to initiate an e-alliance.
- The e-car rental service Strominator (now next move) has been operating in Leipzig since 2016.
- From 2015 to 2017, the measures and implementation concept "Leipzig - City for Intelligent Mobility" was developed after a long-term participation process.
- With the "new mobility" trade fair, the city of Leipzig is a trade fair location for e-mobility.
- The city of Leipzig enables companies to test e-vehicles through its SME support programme.
- The city administration and municipal companies already have well over 60 e-vehicles.
- Leipzig is already among the top ten German cities in terms of charging infrastructure.

In April 2020, the inventory of charging infrastructure comprises 110 locations (mostly charging columns) with a total of 369 charging points. The total capacity of all charging points is 6,804 kW. The main focus of the charging infrastructure is in the city district of Mitte. A total of 168 charging points can be found here. The district of Zentrum-Ost (including the main railway station) has the highest number of charging points, 61, of which 52 are privately operated. In the centre of Leipzig, the number of publicly accessible charging points is highest with 28 charging points. In the centre-west and centre-northwest areas, the number of charging points is lower, at seven and eight respectively. A relatively high number of publicly accessible charging points can be found in the districts of Zentrum-Südost (21 charging points), Lützschena-Stahmeln (with freight centre, 16), Connewitz (11) as well as Paunsdorf, Zentrum-Süd and Seehausen (10 each).<sup>14</sup>

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<sup>14</sup> Stadt Leipzig, Amt für Wirtschaftsförderung (Hrsg): Ladeinfrastrukturkonzept für E-Fahrzeuge in Leipzig im Rahmen des Geen City Plan Leipzig. Redaktionsschluss: 07.07.2020, 82 Seiten, Leipzig 2020  
<https://static.leipzig.de/fileadmin/mediendatenbank/leipzig->



**Figure:** Known charging stations in the city of Leipzig in January 2020 (dark blue - public, lightblue - publicly accessible and red - private)<sup>15</sup>

[de/Stadt/02.8 Dez8 Wirtschaft Arbeit Digitales/80 Amt fuer Wirtschaftsfoerderung/0 News/2020/568-Ladeinfrastrukturkonzept Leipzig 2020.pdf](https://www.stadt-leipzig.de/Stadt/02.8%20Dez8%20Wirtschaft%20Arbeit%20Digitales/80%20Amt%20fuer%20Wirtschaftsfoerderung/0%20News/2020/568-Ladeinfrastrukturkonzept%20Leipzig%202020.pdf) (retrieved on 21.04.2022)

<sup>15</sup> Ibis, P.6

## ACTION - PROVISION OF DEDICATED CHARGING INFRASTRUCTURE FOR E-TAXIS

### Intro

The market ramp-up of e-vehicles has already begun. However, deficits can be identified in particular for commercial vehicles and e-taxis for businesses. Availability is still limited and cost-intensive. The market introduction of e-utility vehicles is slow, but is considered relevant and is therefore seen as a current and future challenge. The City of Leipzig is aiming to achieve climate neutrality by 2050 and the introduction of electric mobility is an important part of this.

The "Charging infrastructure concept for e-vehicles in Leipzig" as part of the "Green City Plan Leipzig" has produced an inventory: As of 01.01.2020, 743 purely electrically powered passenger cars and 78 electrically powered commercial vehicles were registered in Leipzig. At least 53 % of the 743 e-vehicles were accounted for by commercial or public operators who had registered several vehicles in Leipzig. This compares with a charging infrastructure currently (as of April 2020) consisting of 111 public, 106 semi-public (both together publicly accessible) and at least 152 private charging points, with a total of 369 charging points distributed across 110 locations in the city (mostly charging columns).<sup>16</sup>

The city of Leipzig has a lot of charging infrastructure due to a strong expansion of the charging infrastructure. However, this is not sufficient with regard to the predicted number of vehicles due to the market ramp-up of e-mobility, nor is it sustainable with regard to the availability of space. There is a deficit here that needs to be improved in a targeted manner, because an attractive charging infrastructure can serve as an incentive for the purchase of an e-vehicle. Further densification of the charging infrastructure will also be sought in the future via the German network.

High Power Chargers (HPC) enable an energy supply of 150 up to 350 kW thanks to cooled charging cables. These fast-charging stations offer numerous advantages to both commercial and private users of e-vehicles. With such a charging process using a fast-charging point, batteries can be full again within around 45 minutes. In particular commercial e-vehicles, including e-taxis, are dependent on charging their car within a very short time, as they are otherwise at a disadvantage compared to other market participants.

However, fast charging stations are associated with high costs, so that individual companies and private individuals are reluctant to install this infrastructure.

### E-MOB reference

In the fourth Peer Review, the Kozani project partner presented its good practice "Electromobility deployment: electric taxis in Thessaloniki". In it, the importance of the electrification of the taxi fleets was highlighted. After all, taxis are responsible for a large proportion of the vehicle kilometres travelled in cities. In Leipzig, there have already been steps towards further transformation in this area, for example

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<sup>16</sup> Ibis. p. 1

through the Clever Shuttle service. CleverShuttle is Germany's leading operator of on-demand ride pooling<sup>17</sup>, for which they use e-vehicles. At its peak, 64 e-vehicles from CleverShuttle drove through Leipzig, refueling as efficiently as possible. In the Corona pandemic, they unfortunately discontinued their service in Leipzig due to plummeting passengers. Now, as a partner of public transport, CleverShuttle supports cities, districts and transport companies in implementing efficient and emission-free on-demand transport on the road. But the discontinuation of this service for all passengers showed that there was an important need to boost the process of electrification of taxi fleets. Aufbauwerk brought this practice to the attention of the City of Leipzig and thus initiated a discussion about possibilities for further steps, like fast-charging infrastructure for commercial e-vehicles, in this area.

### Action

Exclusive fast-charging infrastructure should be created for e-taxis (BEVs) at important and highly frequented points in order to reduce availability problems and reservations. Otherwise, e-taxis have a disadvantage compared to normal taxis on the market. As a starting point, the city of Leipzig aims to create a separate strategy paper on taxi electrification. Based on that, an HPC charger (>150 kW charging capacity) is to be installed as a pilot at the main railway station, which may only be used by occasional traffic. The two public charging points that have been installed so far (Central Station multi-storey car park East - 1 x 50 KW CCS innogy E-Roaming/enviaM and at the station forecourt Kurt-Schumann-Str. - 1 x 50 KW CCS of Stadtwerke Leipzig) are not sufficient for taxi operations and offer too little power when needed. But a fast-charging infrastructure has already been built for CleverShuttle at the main station and could now be used for e-taxis. Later, the number and distribution can be increased until sufficient public fast-charging infrastructure is available. A separate tariff should be offered for the taxi industry. The charges at the charging station(s) for taxis should be based on the pricing for taxis e.g. in Hamburg or Stuttgart. The low-cost electricity at fast chargers should contribute to an economically attractive alternative to the internal combustion engine in the overall calculation. The implementation of the measure is to serve as an initial offer in conjunction with the test programme for the use of e-taxis.

### **Aufbauwerk aims to include this measure on creating E-Taxi infrastructure in the update of the concept "Leipzig - City for intelligent Mobility"**

The Update will be structured in different parts e.g., E-mobility (vehicles), E-Mobility (Infrastructure), Logistics, Smarter City and Incentive systems/concepts. The infrastructure for e-taxis would fit into the part "E-Mobility (Infrastructure)". The block collects a number of measures that aim to strengthen the ability for private and public actors to switch to e-vehicles.

Aufbauwerk was closely involved in the development of the concept update. This was accomplished possible through regular meetings with the responsible office for economic development. In addition, Aufbauwerk already worked together with the office to design and accompany the tender for an external contractor who carried out the update in order to ensure the inclusion of the aforementioned action. The created update is currently reviewed and evaluated by the Office for Economic Development and Aufbauwerk. After that it will be given to be approved by the City Council of Leipzig.

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<sup>17</sup> Ride pooling is the bundling of ride requests. Typically, this principle is used for on-demand transports. Instead of transporting passengers individually, ride pooling combines trips with similar routes. <https://www.clevershuttle.de/blog/was-ist-eigentlich-ridepooling>

### Participants

- **City of Leipzig** - Office for Economic Development
- **Aufbauwerk Region Leipzig GmbH** – Project Partner
- **Mobilitätswerk GmbH** – external contractor

### Timeline

Time	Milestone
08/2019-07/2022	Collection of Good Practices from other European Regions through Interreg projects E-MOB and Cli-Mob2050
01/2021-07/2021	Selection of suitable measures in consultation with the Office for Economic Development through monthly meetings
08/2021	Call for tenders for updating the concept
09/2021	Selection of the best offer by the Office for Economic Development in cooperation with Aufbauwerk (Mobilitätswerk GmbH)
10/2021-12/2022	Update of "Leipzig - City of Intelligent Mobility by the external contractor
01/2022-06/2022	Review and evaluation of the concept by the Office for Economic Development in cooperation with Aufbauwerk
12/2022	Resolution and approval of the concept including the provision on e-taxi infrastructure by the Leipzig City Council

### Financing

By using the existing and currently under used fast-charging infrastructure of CleverShuttle, no costs are incurred. The costs of installing new charging pole of usually around 10,000 euros can be saved hereby. If costs are incurred, e.g. for meetings, these are borne by the general budget of the Office for Economic Development and Aufbauwerk Region Leipzig GmbH.