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Electrifying a company car fleet Goals and insights after 550.000km

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Abstract

Electrifying a company car fleet seems to pose a serious problem to most companies. But why is this so? This was the question we wanted to answer – and find a solution to the seemingly overwhelming problem.

After being part of several RnD projects regarding electric mobility we started in 2014 with the development of a concept to electrify at least 10% of our company fleet. We already had experience with short range EVs as pool cars. So the next step was the long distance. In January 2015 the first long range capable cars were integrated in our company fleet and only six months later we reached our goal of a 10% electrified company fleet and in June 2016 about 20 EVs will be part of our fleet which means about 20% of our company cars will be EVs.

To achieve this we had to redevelop the processes of our company-car-management, develop and establish values, which also considered ecological aspects, start to change the minds of the management and the employees. Another step was the development of a fair pricing model as unfortunately EVs are still more expensive than gas powered cars and there are almost no subsidies in Germany for EVs. In addition, it was very important to tackle the problem of charging and accounting of charging at home, which is a big issue in Germany.

After roughly 550.000 km on the road with our EVs we now have ironed out most stumbling blocks in the processes and also got used to the challenges of using an EV in everyday life with long range journeys to customers as well as private trips.

Most of the problems that seem to prevent a company to electrify at least parts of their fleet could we solve, so our approach could be a good practice guide to other companies.

1 Why electrifying a company fleet?

We have a strong history in electric mobility, so electrifying (part) of the company fleet was the logical next step.

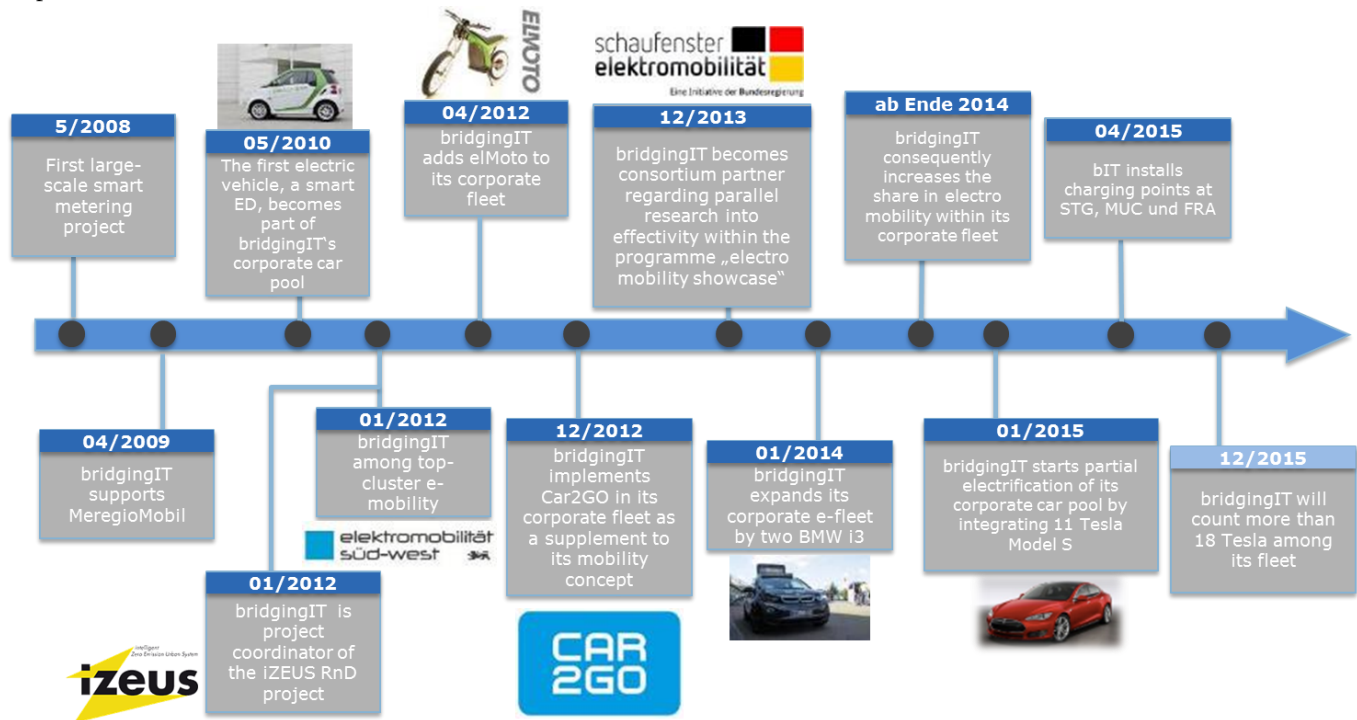


Figure 1 our history in electric mobility

At the beginning of the project, we set some goals we wanted to reach. This goals, addressed not only ecological topics but also HR and classical economical goals of a company.

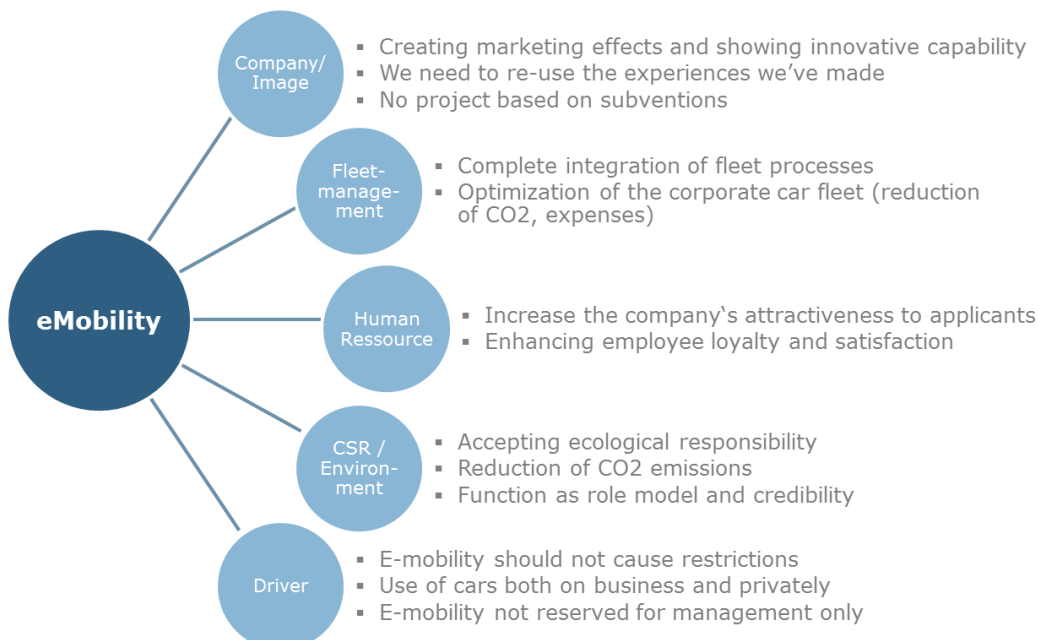


Figure 2 Goals of the project "e-mobility"

Now, after driving about 550.000km with our EVs – since end of 2014 – we have done an evaluation of the goals we set. Did we reach them? Were those goals the right ones to convince a business manager to electrify his fleet?

2 How can it be done

Only ecological arguments will not convince the management of most companies to electrify their fleet. Therefore, we devised a three stages holistic approach:

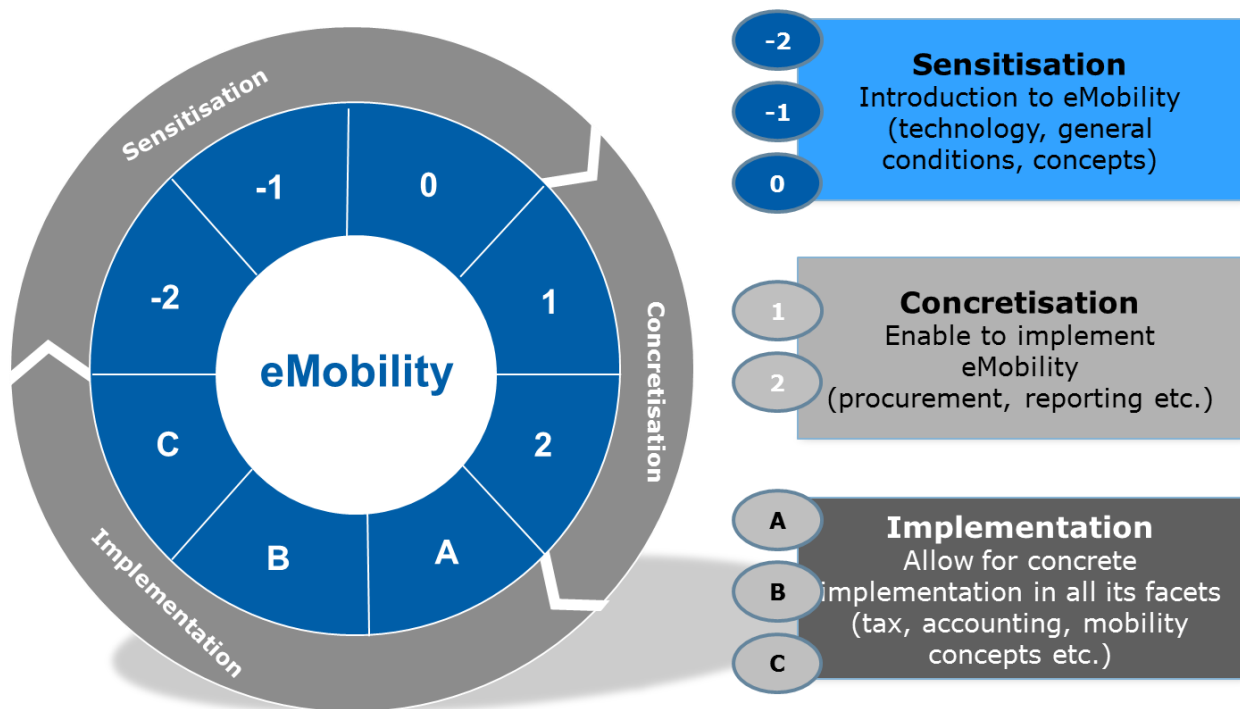


Figure 3 Three stages holistic approach to electrify a company car fleet

At the start you have to check how much the other party knows about electric mobility, according to that you have to adopt the project / process. This should be done, before you move to the concretisation part of the approach.

In this holistic three-stepped approach, the following fields of activity should be considered:

2.1 Motivation and benefits

The first step is to show why it is useful to electrify a company fleet. To address this we posed and answered some key questions.

Does it make sense to electrify the fleet?

Yes, because:

- Electro mobility makes a significant contribution to reducing the environmental impact of transport.
- This leads to a reduction of CO₂ and energy costs
- Efficiencies in resource consumption of the company (corporate carbon footprint) can be realized.
- The expectations of society is steadily increasing in regard of environmental responsibility. This is also a part of the corporate image of each and every company
 - A positive image in society constitutes a competitive advantage
- Locally emission-free
 - With domestic and energy from renewable sources a very low emission is realized
- Efficiency
 - 70% of primary energy is converted in pure movement by EVs

- Comfort and fun
 - Electric vehicles are silent and have a compelling drivability

Is electro mobility already suitable for everyday use?

Yes, because:

- There are vehicles now available for almost all applications of a company car fleet
- Almost every OEM offers at least one electric vehicle
- The technology is mature, tested and durably
- The range of 100-150 km, is more than adequate for most Use Cases
- In fleets the rides are mostly known in advance and can be planned
- Vehicles can be charged overnight and thus are ready in the morning
- Usually no special charging infrastructure is required

Aren't EVs much more expensive the combustion engine cars?

That depends...

- Electric cars have significantly lower operating and servicing costs as combustion engine cars and are exempt from road tax (in Germany)
- Electric vehicles have extremely low maintenance costs
- Electric cars are already more economical than similar combustion engine cars in some deployment scenarios.
- On the economic analysis of many individual factors such as holding period, application, mileages, fuel costs, and should be considered separately in each individual case.

In our discussions with other companies and cities struggling with the electrification of their fleet we almost always faced the problem that very little is known about electric mobility outside of the community. The most pressing points were:

- Lack of knowledge about cost aspects such as fuel, and maintenance costs
- Missing vendor and Technology overview of charging infrastructure
- No knowledge about available EVs
- No Experience in handling an EV and the charging infrastructure
- Uncertainty about the future development of the EV technology
- Range fluctuations through auxiliary aggregates, weather and aging of the battery
- No business goals to drive the electrification of the fleet

2.2 Drivers and Stakeholders

Drivers

Although EVs today pretty capable of covering a lot of scenarios, there is still the need to ensure a EV fits the specific driver profile. This has to be done, in advance of the deployment of the EVs. Therefore we developed a sophisticated, yet highly customizable questionnaire which we used in all of our talks with other companies. This questionnaire addresses the following topics:

- Expectations to the vehicle
- Driving profile / application
- Driver profile
- Charging options available at the company / at home / ...

Other Stakeholders in the company

Especially large companies have multiple business units and stakeholders on such a topic which are directly and / or indirectly involved.

These parties should be identified at an early stage and integrated in the decision-making and change process. Only by doing so we were able to generate the maximum benefit for the company.

2.3 Vehicle usage

Scenarios and appropriate vehicles have to be described in detail to be analyzed and mapped on the available EVs. To do this we developed a short list of requirements and conditions:

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- Driving profiles should be repeatable
 - Driving long distances (> 250 km) at present is only with two EV models (Tesla Model S and X) reasonably possible
 - Big differences between individual fleets
 - Charging times have to be considered
 - Full electrification in some fleets already possible
- Standard range according to the NEDC must be reduced by 20-25% in practice
 - Winter range significantly lower than the summer range
 - 100 to 150 km are possible today
 - Fleet fleets often suitable for (partial) electrification, but: individual analysis necessary
 - Intelligent scheduling systems for the practical implementation of electrification scenarios necessary

2.4 Cost and efficiency

A detailed and realistic economic analysis has to be carried out. This has to be done individually for each company, city or community. But of course there are some points that show up in every analysis and thus can be considered universal:

Major levers on the economic calculation are

- Holding period
- Financing and special discount offers
- Development of fuel costs
- Annual mileage
- Remaining value of the vehicle

The following assumptions may be set to reduce the uncertainty:

- No full cost accounting
- Remaining value of the EV and the combustion engine vehicle the same percentage
- Insurance costs roughly the same
- EV maintenance costs are 50% lower than maintenance costs of a combustion engine car

To present a forecast we have made the following assumptions based on the knowledge gained in several RnD projects like SGI, IMEI and the “Showcase Electric Mobility”.

Vehicle costs

- The vehicle costs depend fundamentally on the cost of the battery. For batteries we expect in the next 3-5 years significant cost and performance improvements. We and other experts expect that at least by 2020 EVs will be as cheap as combustion engine cars.
- The experience of OEMs with electric vehicles in the market is increasing every, thus lower costs and better services are to be expected
- The quality and reliability is constantly improving
- Once the numbers increase, we will see positive cost effects on batteries, EVs and charging infrastructure

Energy costs

- The cost of electricity and fuel costs are likely to rise even further in the future. It ultimately depends on the respective increase how attractive electric vehicles will be.
- Renewable power generation offers the opportunity to produce very cheap energy. This can be a significant cost advantage for electric vehicles.
- A risk is the German state which is not taxing driving electricity at the same level as gasoline

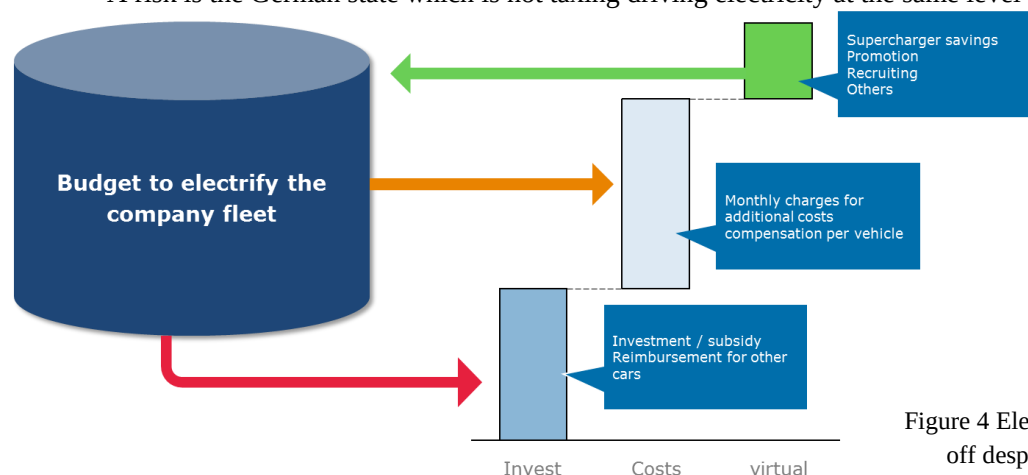


Figure 4 Electro mobility pays off despite higher cost

3 Results and good practices after 550.000 km

Until now we have over one and a half year of experience driving a electrical car fleet. As mentioned in chapter one, we set us several goals as we started the project. In the last months we evaluated which goals we met.

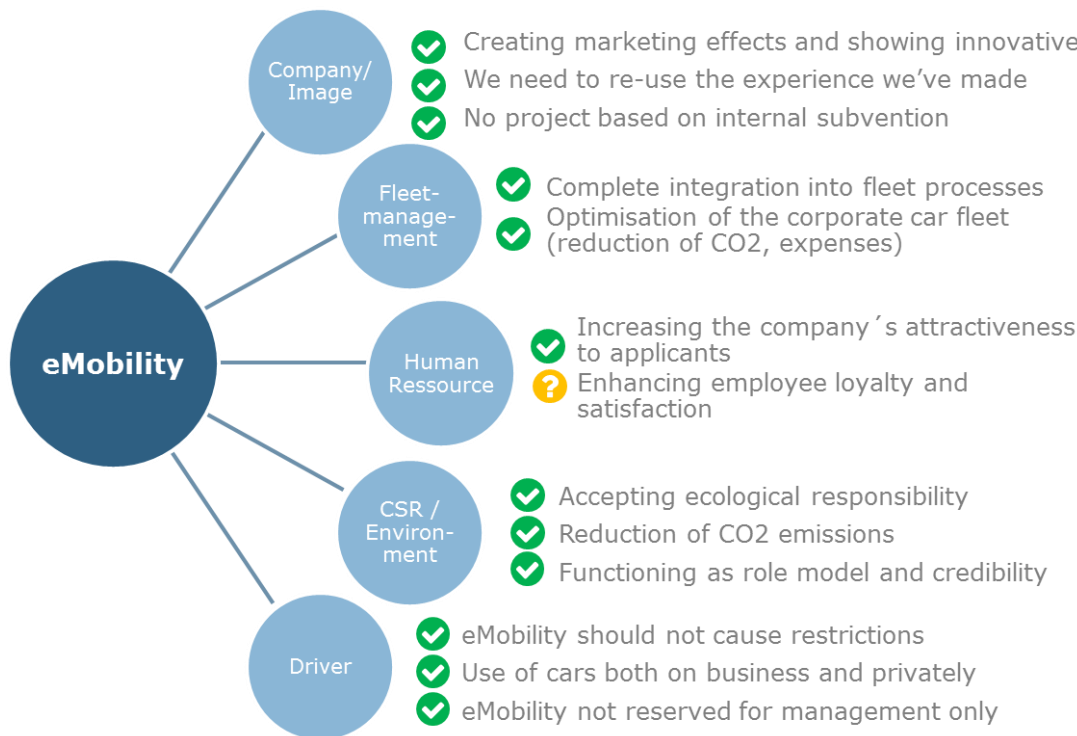


Figure 5 Evaluation of the project goals

3.1 Company / Image

- Electrifying our fleet attracted positive media attention, thus increasing the awareness for our business throughout Germany.
- Our experienced enabled us to develop a generic procedure model regarding the electrification of corporate fleets.
- We are able to inspire customers with both our willingness and capability to innovate
- Baden-Wuerttemberg's minister of transport, Winfried Hermann, visited us and our fleet

3.2 Fleet management

- Currently, more than 12 % of our corporate cars are run by electricity
 - 14 Tesla Model S number among our fleet since December 2014
 - 18 Tesla Model S are of our fleet since December 2015
 - 2 BMW i3 are part of our fleet
 - 1 Smart ED is part of our fleet since May 2015
 - 1 Renault Zoe is part of our fleet since January 2016
- Right now we have Germany's biggest electric long-distance fleet
- More than 10.000 EUR fuel costs saved by our Tesla fleet, 50% of all charging processes were for free

- Due to full integration into fleet processes, electric vehicles may be ordered by any of bridgingIT's employees
- We received awards like the TÜV Green Fleet Award 2015 and have fully supported our environment certification measures

3.3 Human Resources

- Providing the opportunity of driving electric vehicles is a USP against other companies concerning applicants
- Employee motivation was increased
- E-Mobility was and still is an issue interesting for all. There are permanent requests for electric vehicles as company cars
- Drivers act as multipliers and also attend recruiting events and provide internal feedback to interested colleagues
- Possibility to use existing EVs for personal testimonials to gain knowledge about eMobility

3.4 CSR / Environment

- More than 15% of the fleet are already run by electricity
- Overall fleet consist of about 160 cars, with 125 cars with efficiency class "A" or "A+"
- From car policy through to an integrated mobility concept (e.g. BahnCard 100 first class or BahnCard 100 second class plus small e-car or e-vehicle or conventional vehicle)

3.5 Drivers

- Company cars with the option of personal use and direct assignment of drivers to cars
- Every employee holding the privilege of a corporate car has the opportunity to configure an electric vehicle
- Full availability, both on business and for personal use
- Electric Mobility is not only a project for the upper management, it is available on all company levels from consultant to CEO
- No restrictions on the use of the car, but also no fall-back- scenario for EVs

3.6 Risks

Which risks did we take into account and how did we meet them?

- **External perception as ,fancy‘ consultants:**
Proactive communication – we deliberately live the issue of e-mobility, driven by our sustainability-oriented business strategy
- **Internal envy due to preference of some employees over others:**
Making electrification available to all of the company's employees holding the privilege of a corporate car, regardless of hierarchical level
- **Everyone can – though no one has to:**
No one was pointed out as future EV driver. Everyone decides by him-/herself if it is possible
- **Cost increase through subventions:**
Development of a model with joint participation of both company and employees.

3.7 The obvious next step to take



Figure 6 The obvious next step

4 Some facts after 550.000 km regarding charging and CO₂:

Charging

After driving roughly 550.000 km in one and a half year about 140.000 kWh of power was consumed. In this time the EVs also had to be charged:

- For 46% of the charging operations a wall box at home was used
- 28% took place at a Supercharger (for free)
- 23% took place at a public charging station and
- 3% were others.

Therefore, by a deliberate selection of charging infrastructure mobility costs were saved.

In the time since December 2014 all of our cars combined travelled per day around 1.250 km. The average travelling distance per day and car was around 85 km.

CO₂

Until the End of June 2016, after driving roughly 550.000 km about 82 tons of CO₂ were saved by driving EVs.

Authors



Sven Lierzer was born on June 2nd 1982. Following his studies of political science and sociology at the University of Tübingen, he started to work at BridgingIT GmbH.

In the last five years he has been engaged in issues of several industries mainly utilities. He worked on innovations such as Smart Grids, new mobility concepts e.g. electric mobility and smart cities, both on national and international level. At this, Sven Lierzer advises large companies and corporations as well as governmental organizations on aligning their strategy.

Sven Lierzer is a member of several expert circles including:

- *Representative of BridgingIT GmbH at the BEM e.V. and the Smart Grids BW e.V.*
- *Project manager and electric mobility expert in the leading edge cluster Electric Mobility South-West projects SGI and IMEI*
- *Expert at the parallel research into effectivity within the German federal program "Electric mobility Showcase"*
- *and author/co-author of various publications plus expert in various special topics as:*
 - *Research program "Horizon 2020" of the European Union*
 - *Electric Mobility E-Roaming, Smart Charging and Smart Grid*

Within the scope of innovation and business development Sven Lierzer is engaged with the current trend topic of Digitization – from Big Data, Industry 4.0 and demographic change through to issues of the whole transformation of industries.



Matthias Vogt was born on September 09, 1975. Following his studies at the Stuttgart University of Applied Science in mechanical engineering Matthias started his career as a service engineer for Passenger Cars at Daimler AG. For more than 14 years, he worked on reliability issues, customer experience, R&D and product management of passenger cars and buses at Daimler AG.

In 2013 Matthias switched as senior consultant to bridgingIT and is responsible for innovations in the smart mobility market. At this, Matthias Vogt advises large companies and corporations as well as governmental organizations on aligning their strategy concerning mobility and

electricmonilize issues..

In the monitoring and impact research for the German showcase program for electric mobility Matthias is responsible for the core-topic „User“ and is aggregating the findings concerning electricmobility users of more than 145 projects in the German showcase program.