
Public EV-Charging Infrastructure in Germany

Fact-Finding Mission to Berlin in April 2018

Partner Ministries:



GOVERNMENT OF INDIA
MINISTRY OF POWER



Federal Ministry
for Economic Affairs
and Energy

Supported by:

giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

Imprint

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Special thanks to:

Mr. Dennis Knese, GIZ

In cooperation with:

Federal Ministry for Economic Affairs and Energy (BMWi)
Ministry of Power (MoP)
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)

New-Delhi, June 2018

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Business model presentations

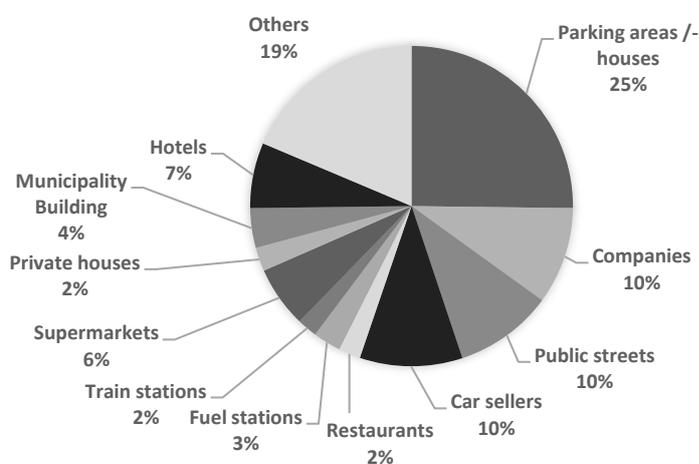
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Number of charging points in Germany: There are currently around 18.000 public or semi-public charging points, which are mainly located in urban areas. Number of public charging points is expected to triple by 2020 providing a sufficient infrastructure for electric mobility in future. Due to an EU regulation, the public charging point operator and the distribution grid provider have to be different companies. DISCOMs cannot claim charging point operation and service provision for themselves. Charging point operator and charging point service provider can be one company. In Germany there is no range problem on highways anymore, because sufficient DC charging stations have been build-up, mainly funded by the European Union.

Types of charging points (regarding location and accessibility):

- Public charging points: 24/7 accessible for everyone, located on public ground
- Semi-public charging points: not fully 24/7 accessible (e.g. in car parks that close at night) and/or not for everyone usable (e.g. only for customers of a certain supermarket, fast-food store etc.), on semi-public ground
- Private charging points: only accessible for owners, located on private ground (e.g. in private garages)

Position of public and semi-public charging points in 2016 in Germany:



source: chargemap.com

Number of electric vehicles in Germany: Increase in 2017 by approx. 150 %. If this development continues in the next years Germanys official goal to have 1 Mio. EVs on the streets in 2020 will only be achieved in 2023. In the same time, DISCOMs need to enhance their grid to make it suitable for the expected strong increase in electric vehicles charging.

Charging points for multi-flat buildings: There is no right so far for tenants to have a charging point. New EU regulation has been passed which regulates that new or major renovated residential buildings with more than ten parking spaces have to be equipped with the dedicated infrastructure suitable to allow for the subsequent installation of a recharging point for all parking spaces. The same will apply for non-residential buildings with more than 10 parking spaces. For such buildings, at least one

recharging point will also have to be installed and made available for users (e.g. to charge their vehicle while at work).



Mr. Kriegers, BDEW, explains the development of Germany's charging infrastructure

Core message of the meeting: In the last two years there has been a strong push in the development of public charging infrastructure with increased involvement of DISCOMs and industry. Companies invest not demand driven, but because of securing future market shares in a very fast developing market.

Contact: Dr. Stephan Kriegers,
More info: <https://www.bdew.de/>



Senate Department for the Environment, Transport and Climate Protection Berlin

The office for Principle Affairs of Transport Policy of the Senate Department of Berlin is in charge of the coordination and development of public charging infrastructure in the City of Berlin. Mr. Blümel, expert for electric mobility, explained that Berlin has developed its own concept and roadmap on how to roll out public charging infrastructure to create efficiency in the use of public space.

The Berlin concept includes:

1. interoperability of services (standardised interfaces, open protocols and basic authentication devices for access)
2. location planning by municipality
3. intensive monitoring of the demand
4. time based tariff to prevent misuse of parking lots at charge points
5. regulations to guarantee easy, non-discriminatory access to all services of all operators and types of infrastructure use, to prevent discriminating structures based on individual business models

In Berlin a municipality permit is necessary which includes paying a fee to set up a charging station in public space of Berlin.

Public charging tariffs: Upper cap is set by municipality by calling for offers for 11 kw and 22 kw. Upper cap for charging tariffs is then fixed for 5 years.

Berlin's technical standard for charging infrastructure works with Mifare classic minimum communication standard for RFID cards (Standard in all over Europe). Further detailed information on the Berlin standard and authentication platform are given in the presentation linked below.

Ratio between charging points and EVs: In Berlin there are currently about 600 public and semi-public charging stations for about 2000 BHEV and 2000 PHEV. This results in a current ratio of three electrical vehicles per one semi-public/ public charge point. Compared to this, Norway has about 1 charge point per 15 to 20 EVs.



Integrating charging infrastructure in cities - the Berlin Modell

Presentation to Mr. Aniruddha Kumar (Ministry of Power)

Indo-German Energyforum (IGEF), 2018-04-19

Hermann Bluemel

Senate Department for the Environment, Transport and Climate Protection Berlin

Contact: Mr. Hermann Bluemel

More info: <https://www.berlin.de/sen/uvk/en/>

Presentation available for download here:

https://www.energyforum.in/fileadmin/user_upload/india/20180419_Senatsverwaltung_Berliner_Modell_Ladeinfrastruktur.pdf



Ubitricity GmbH

The company develops and operates intelligent charging and billing solutions for EV charging.

Ubitricity's Smart Cable includes all the relevant technology inside the charging cable (smart meter with communication technology and billing). According to Ubitricity, the investment costs of charging stations can therefore be reduced to a minimum. Smart Cable provides for automatic authentication at the charging spot, communication with the Mobility Service Provider (MSP), exact recording of the charged electricity down to the kWh and is compatible with all standard charging infrastructure. All billing is done by Ubitricity and the consumer has predefined charging costs due to the monthly energy charging plan that comes with the smart cable (similar to mobile phone plans).



Contact: Dr. Frank Pawlitschek

More info: <https://www.ubitricity.com/en/>

Video: <https://www.youtube.com/watch?v=azpGn58aB6w>



Ebee Smart Technologies GmbH

The company develops charge point spots and modular kits for CPOs that can be easily integrated into existing public infrastructure (eg. light posts), through which costs and public space can be saved compared to separately build-up charging stations.

Ebees "Chargespot Berlin" is a compact, cost effective, smart public charging solution designed to be easily mounted on streetlights, walls and similar street furniture. It features power rating up to 22 kw



and built-in certified meter options for every market. Load and energy management is possible, because they form a grid to distribute available energy in a configurable, dynamic and effective way. Ebee's charge spot is controlled by the CC612 Charge Controller, designed and programmed by the company itself. Mr. Wilhelm from Ebee mentioned that the hardware of Ebee's chargespot could even be produced easily by a third party in India. Ebee would design specific contracts, but

the charge controller, which includes the communication technology, would have to be provided by Ebee.

Contact: Mr. Peter Wilhelm, peter.wilhelm@ebee.berlin

More info: <http://www.ebee.berlin/>



Allego GmbH

Dutch company Allego constructs, operates and maintains charge points for electric vehicles on behalf charge point service providers such as municipalities, businesses and public transport companies throughout Europe. Allego operates currently approx. 200 charging stations in Berlin. Allego exclusively works as a Charging Point Operator (CPO). The company provides backend solutions for operation of chargers of various manufacturers, hardware consulting and selection, installation and connection, servicing and maintenance, data management, monitoring via customer portals and more.



Delegation meeting with Mr. Schulte, Chief Operations Officer, Allego GmbH, in Berlin.

Business model: Operating as a CPO is a long-term business. 5-6 years are currently needed for return on investment (ROI) in Germany (including permits, construction, operation). One reason is that the average use of charging post is currently around 0,5 sessions per day in Berlin (but already 11 sessions per day in the Netherlands).

Tender knowledge: Allego has profound knowledge about tenders and tender design. Also, Allego would be willing to share their knowledge on the EV cloud to build up a CPO in India.

Contact: Mr. Ulf Schulte

More information: <https://www.allego.eu/>

Presentations of Allego available for download here:

https://www.energyforum.in/fileadmin/user_upload/india/media_elements/presentation/20180417_BETD_SG1_EVCharging/01_20180419_Allego_Corporate.pdf



Berliner Wasserbetriebe

The public water company Berliner Wasserbetriebe operates an electric fleet with its own charging infrastructure. The operation of the electric fleet is part of Berlins contribution to reduce NOX and CO2 emission and meet the emission limits set by the EU of 40 µg/m3 (annual mean value).



Delegation testing charging infrastructure of the Berliner Wasserbetriebe.

EVs and charging infrastructure: the company has 1000 vehicles in total, of which 82 are EVs. The EVs are mostly charged during the night because quick charging during the day is not provided. Company has set up 106 slow charging points in 28 different locations in Berlin not shared with the public or employees so far. The latter will be implemented by the time the charging of employee cars is not counted as taxable income anymore.

Contact: Mr. Volker Lengnick

More information: <http://www.bwb.de/content/en/html/index.php>

Federal Governments Joint Unit for Electric Mobility (GGEMO)

The Joint Unit for Electric Mobility was founded in 2010 to coordinate the work of the federal government regarding electric mobility between the different ministries (Economic Affairs and Power, Environment, Research). It hosts stakeholder consultations with participants from politics, science and industry to find the fastest path of developing Emobility, develop roadmaps for more EVs, start research activities and find financial and non-financial incentives for municipalities for Emobility. There is a strong push of the Federal Government right now to electrify public transport with the goal to reduce NOX emission in cities where EU limits are currently exceeded.

Energy supply for Emobility: Increase in the number of EVs will not be a problem for Germany. 40 Mio EVs would for example only require 5%-10% more electricity than consumed today and Germany already exports currently 10% as surplus energy.



Discussion with Mr. Schulz and Mr. Fischer-Wohlfarth (GGEMO) about how to roll out public charging infrastructure.

Government funding for public charging infrastructure the Federal Government has set up 300 Mio. EUR fund in 2017 for fast charging stations and a 100 Mio EUR fund for slow charging stations with different calls each 6 month:

- condition for access to this funding: charge spots must be 100% publicly accessible (but it can be private / semi-public ground), CCS is minimum requirement, source of electricity must come from renewable energy sources
- funding can be provided for municipalities, private companies and also private persons
- funding goes up to 40% of the investment costs but no more than 5 Mio. EUR per single bid
- applications for funding have to be send in online, first come first serve principal used
- more information on funding guidelines: <https://www.now-gmbh.de/en/bundesfoerderung-ladeinfrastruktur/foerderrichtlinie-foerderaufufe>

Charging infrastructure goal of the German Federal Government: build-up 5000 publicly available fast charging stations until 2020 along the highways and 100.000 charging points in general until 2025

in Germany (California has same size in population and area with similar goal). Currently there are 10.170 AC points in Germany and 530 DC points mainly at super highways.

Funding for EVs: Federal Government has set up a fame scheme grant for EVs in Germany with 600 Mio. EUR fund for private EVs and 100 Mio. EUR fund for EVs in municipalities.

Contact: Mr. Leo Schulz

More information: <http://nationale-plattform-elektromobilitaet.de/en/the-npe/organisation/>



Charging Interface Initiative e.V. (CharIN)

CharIN has the goal to develop and establish the Combined Charging System (CCS) as the international standard for charging battery-powered electric vehicles of all kinds. The associations objective is to draw up requirements for the evolution of charging-related standards and to develop a certification system used by manufacturers implementing the combined charging system in their products.

CCS combines the following aspects: single system (simplicity), one standard for all use cases (safety), long term invest production (cost), 350 kW+ (reliability & quality), AC/DC (power & time), Up-/downward compatible (Interoperability).



Advantages of CCS: Internationally CCS is the most established standard for electric vehicles charging, only China and Japan have developed different standards. CCS is a basically open source standard. Therefore, it is available for everyone almost free of costs. EV production made in India with CCS would be possible. In mass procurement, DC charger technology without any installation, shipment or customs is currently available from 10.000 EUR and above. More detailed information on CharIN and CCS is available in the presentation linked below.

Contact: Mr. Claas Bracklo

More info: <https://www.charinev.org>

Videos: <http://charinev.org/media/media-center/>

Presentation of CharIN available for download here:

https://www.energyforum.in/fileadmin/user_upload/india/20180420_CharIN_CCS_Standard_for_EV_Charging_in_India.pdf

Emmy - Electric Scooter Sharing in Berlin <https://emmy-sharing.de/en/>

Emmy is a company offering electric scooter sharing in Berlin and other cities in Germany. Access to the scooters is provided via an App. Payment for renting the free-floating scooters is either on basis time of use or distance travelled. Each scooter comes with two helmets and an integrated mobile phone bracket to easily use navigation systems while driving. Currently Emmy operates 350 scooters in German cities. Costs of using Emmy's scooters are 19 cent EUR per minute driving, 5 cent EUR per minute parking and overall not more than 24 EUR per day.

Video: <https://www.youtube.com/watch?v=jFqe0nZfUX0&t=105s>

Electric Taxis

Pool Taxi <http://clevershuttle.org/en/home/>



Electric pool taxi of Clever Shuttle (Nissan Leaf).

Tesla Taxis



One of the first Tesla taxis in Berlin.

Mobile EV Charging <http://chargery.de/>

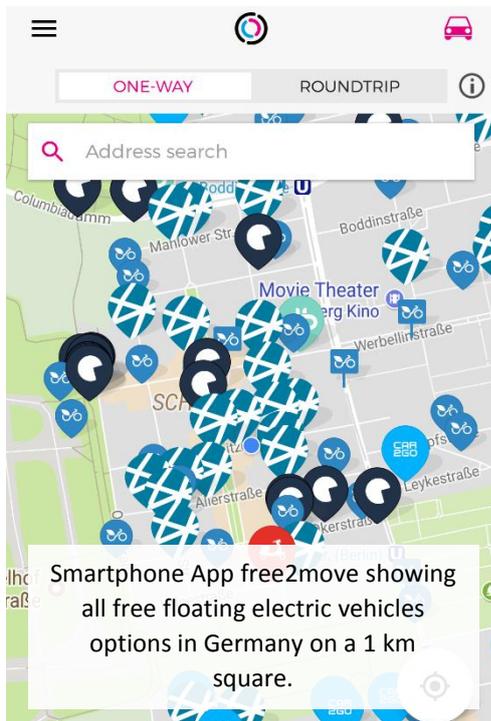


Chargery GmbH brings mobile EV battery charging by muscle power to stranded EV's.



Delegation inspecting mobile EV battery system.

Electric Carsharing in Germany



The two biggest car sharing companies in Germany are DriveNow (BMW) and Car2Go (Daimler) Both run by an App, with which you can access any of their cars. Besides conventional cars also electric cars can be rented, which the delegation tested during their fact-finding mission in Berlin.



<https://www.drive-now.com/en>

<https://www.car2go.com/US/en/>

Free floating bicycles

In major German cities free floating bicycles are publicly available. Some offer electric bicycles as well. The Government owned company Deutsche Bahn has set up its own bike hire system “Call a Bike” with right now more than 15.000 publicly available bicycles.



Original picture: [RudolfSimon](#), [Call-a-Bike Berlin](#), CC BY-SA 3.0

<https://www.callabike-interaktiv.de/en>

<https://www.limebike.com/>

Tesla's charging solutions

The supercharger is a fast charging technology for electric vehicles from Tesla. Tesla established 1.210 charging stations consisting of 9.428 superchargers worldwide on their own expense. For car owners of Tesla charging is free of cost. The latest supercharger technology charges the battery with 150 kW at 480 V. A Tesla EV with a battery capacity of 70 kWh will be charged in ca. 30 Min up to 80%, which corresponds in a range of 443 km. All the superchargers are located at key intersections across Europe, providing the possibility to travel around Europe fully electric. More Information: https://www.tesla.com/en_GB/charging



Source of picture:

https://www.tesla.com/en_GB/supercharger

Electric fleet of German Mail Service DHL

Deutsche Post DHL Group operates the largest electric fleet in Germany with its own developed and self-produced Street-Scooter vehicles as well as around 10,500 e-bikes and e-trikes. DHL has set up a group-wide environmental protection program GoGreen which defines the new global target: zero emissions by 2050.

Therefor the company aims to replace its entire mail and parcel delivery fleet in the interest of the environment and its customers by means of electric vehicles powered by electricity from renewable

energies. The plan of the DHL group is to produce 10,000 E-scooters per year, for themselves, but also for other companies. The current E-scooters fleet is 3,258. The delegation had the opportunity to meet Markus Döhn from DHL at the BETD and experience the company's electric vehicles.

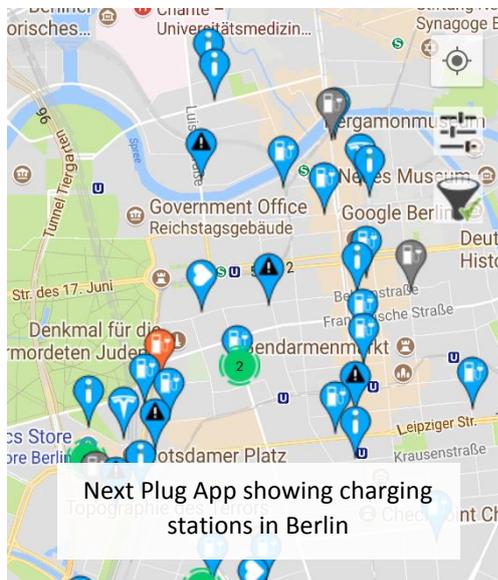


Contact: Mr. Markus Döhn

Video: <https://www.youtube.com/watch?v=0CtZGUw7Uwo>

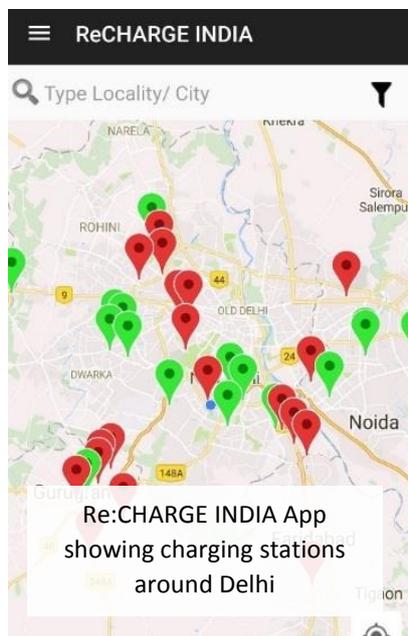
More information: <http://www.dpdhl.com/en/responsibility/environmental-protection.html>

Smartphone Applications for EV Charging – Next Plug



During the fact-finding mission in Berlin the Next Plug app was explained to the delegates. This android application was launched in January showing more than 78.000 charging stations in 48 countries based on a dataset provided by the electric mobility blog Going Electric (www.goingelectric.de). This new app with the most complete dataset of charging stations so far helps electric car drivers to find the nearest available charging stations via car navigation and provide them with updated information on type of charging station (AC, DC, charging capacity, available plug standards) and info about CPO and MSP which run the station.

Smartphone Applications for EV Charging – RE:CHARGE INDIA



Similar to the Next Plug app the Re:Charge India iOS and Android apps were launched in the beginning of 2016. These applications were set up on behalf of the electric mobility platform PluginIndia and are now showing all semi-public and private but accessible charging points in India (current total number of community charging stations - All India: 234). These apps provide users with updated information on and driving directions to the nearest charge points to your location based on Google Maps.

Video: <https://www.youtube.com/watch?v=1DByWDp5WaM>

More information:

<http://www.pluginindia.com/blogs/recharge-india-ios-and-android-apps-launched>

