POWER PLAY

Which providers offer charging electric cars with the most convenience and with utmost price transparency? connect and umlaut found the answers in our first charging network test.

Driving an electric car brings forth a lot of fascination: The attention for current electric cars is not only fueled by eco friendliness, but also by the driving experience. In order to keep up with the acceleration of a medium-class plug-n-go car, quite a lot of a combuster‘s horsepower would be required. And even range is not a real problem any more – most current e-cars reach about 400 kilometers with one battery charge (according to the WLTP testing standard). At the same time, the network of charge stations is expanding, so that a suitable charging opportunity can be found on each route without considerable detours. In addition, the increasing spread of “High Power Charging“ (HPC) in vehicles as well as in the charge points makes sure that charge stops can remain within half an hour.

Teething problems with charging electric cars

This was the good news. Still, drivers of e-cars frequently have annoying experiences as well: By no means every charging station can be used with the supply of charge apps and contracts at hand. The actual prices are not always clear. Not every charging spot is sufficiently marked by signposts, is adequately sized or is covered. And drivers who want to visit a restroom, a restaurant or a shop during their charging breaks, often have to walk there over distances of a couple of hundred meters.

Many topics which early adopters of electromobility struggle with bring up memories of the early days of cellular communications – such as vastly nontransparent pricing and technically shaky roaming (the use of “foreign“ charging stations with one‘s existing e-mobility tariff).

Charging infrastructure under the microscope – just like cellular networks

Thus, it was an obvious choice for connect and its network testing partner umlaut to carefully examine the quality of electric charging stations in an elaborate network test. After all, we know from our own experience: There are big differences between the providers who are active in this marketplace regarding charging experience, technical features, payment options and price transparency.

In our test, we consider another analogy to cellular networks: As usual for smartphone tariffs, in the world of charging infrastructure, there are also network operators (charge point operators, in short CPOs) as well as service providers (electro mobility providers, in short EMPs). The former supply charging stations and networks, the latter take care of apps and payment procedures – although some vendors such as EnBW are engaging in both areas and some charge point operators such als Fastned provide their own apps. Thus, we have divided and evaluated the candidates of our test into these two categories.

As a start, we considered the three currently most popular electro mobility providers and six large charge point operators. In doing so, we have focused on “High Power Charging“ – the fast refilling of suitably equipped e-cars with a wattage of at least 150 kW. The reason is that long distance drivers prefer HPC as their most viable option for charging their electric cars en route. For the tests and assessments, umlaut‘s team conducted test drives with two electric cars (see below). A detailed description of our methodology can be found on page 64. But now, raise the curtains for the results of our first charging network test.

Hannes Ruegheimer

High Performance preferred: In our Tests, we focused on „High Power Charging“ – the favorite of electic long distance drivers.

Thorough investigation : During their test drives the teams of umlaut spent a lot of time at the visited charging stations.

Our test cars

For our tests, we used two of the currently most attractive electric vehicles.

■ Yes, it is an all-electric – but first of all, it is a Porsche. This motto of the developers from Zuffenhausen is not only reflected by the technical specifications shown below, but also in in the driving experience. A highly efficient electro engine at each axle, provides forward motion and stability. Fully charged, the 79.2 kwh battery promises a range of 407 kilometers according to WLTP. The opulent functional and infotainment offerings can be controlled coveniently via the touch screen or using voice commands. The „Intelligent Range Manager“ supports with planning charging stops.
Read our first impression about Porsches electric sports car in connect 1/2020. A complete connectivity test of the Taycan is planned to follow shortly.

Porsche Taycan 4S

390 kW/530 hp; 640 Nm maximum torque; max. speed: 250 km/h; Acceleration (0 - 100 km/h) 4.0 secs; Consumption: 26,9 - 24,6 kWh/100 km; price: from 105 607 Euros

Mercedes EQC 400

300 kW/408 hp; 760 Nm maximum torque; max. speed: 180 km/h; Acceleration (0 - 100 km/h) 5.1 secs; Consumption: 19,7 kWh/100 km; price: from 71 281 Euros

■ „The Mercedes among the electric cars“ is based on the volume model GLC, but was optimized in many details for electric driving. The first all-electric from the Swabian car maker offers four-wheel drive and a lot of driving convenience. Its user interface MBUX (Mercedes Benz User Experience) is among the finest which can be found in the marketplace in terms of connectivity and infotainment operation. In the EQC, it was extended with the management of the 80 kWh battery, offering a range of 445 km (WLTP) including the planning of charging stops. connect awarded 423 of 500 points for the overall package (grade good).
You can real the full connectivity test of the Mercedes EQC in connect 2/2020.

E-MOBILITY PROVIDERS

EnBW Mobility+

The full-range e-mobility provider from Baden-Wuerttemberg offers the most convincing combo of charging app and tariff. But even with the grade "good" there is still room for improvement.

▶ The Baden-Wuerttemberg utility company is active in the e-mobilty market as a full-range provider. It offers it own charging stations especially in its home federal state as well offering as its app "Mobility+" nationwide – including the associated payment service.

The German auto club ADAC also relies on its partner EnBW for offering its own charging card. As Ionity raised its prices in January, EnBW does not support their charging stations for the time being, so that HPC charge points are underrepresented at "Mobility+".

In the tests, setting up an user account turned out to be a little tricky. Once this hurdle was cleared, EnBW scored well for handling and functionality. Its pricing model is also transparent. Charging at different supported locations worked largely without any problems.

Adapted: In the app, plug types and wattage can be selected as needed.

connect verdict: good (830 points)

Maingau EinfachStromLaden

The app and tariff of the e-mobility brand "EinfachStromLaden" (simply charge electricity) left little to be desired in our test. All in all, the service from Maingau Energie GmbH deserved the grade "good".

▶ In recent years, the utility company based near Offenbach/Main turned out to be an important player among the electric mobility providers. Under its brand "EinfachStromLaden" (english translation: simply charge electricity) it offers an app and charging tariffs which provide access to a wide choice of charging points in Germany and all over Europe. In order to provide a navigation function, the app uses the online map service Mapbox.

However, in the test, searching for a suitable charging point, did not always work instantly. Furthermore, in the initial setup no pricing infos were shown. When selecting a charge point later, they appeared nonetheless. But all in all, charging with "EinfachStromLaden" worked without major problems.

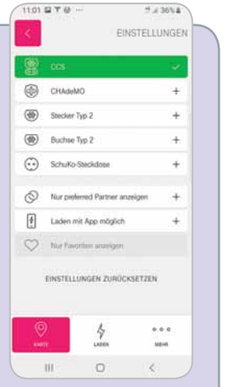
Numerous cars: Vehicle management allows for changing the charging profile.

connect verdict: good (782 points)

Telekom GetCharge

The e-mobilty offering of Deutsche Telekom, provided access to the highest number of charging points in the test, but left room for improvements in details. From July on, the service will have a new owner.

▶ In the middle of our testing, we received news that Telekom will sell its e-mobility service GetCharge to the Switzerland-based vendor Alpiq. Still, for the customers, initially nothing is supposed to change – they can continue to use the app and the subscribed tariff as normal. The Telekom offering goes strong with the best coverage of charging points in our comparison and scored ahead of Maingau in this respect. However, our tests identified some areas where details could be improved – for example we would like to see filter functions better leading to the desired outcome or more information before and after charging. But all in all, everything worked flawlessly here as well – and maybe the new owner will kick it up a notch in the near future.



Ready for insertion: Currently, the GetCharge app only filters for plug types.

connect verdict: satisfactory (685 points)

Interview

„We want to actively shape the future of e-mobility."

Hakan Ekmen, Managing Director umlaut (l.) in discussion with connect's editor in chief Marc-Oliver Bender (r.).

umlaut is known for its worldwide mobile network tests. Why is umlaut now also testing charging infrastructure?
Hakan Ekmen: From its foundation 24 years ago, umlaut has been active in many segments and industries. At the very top: Automotive, Energy, Aviation and Telekommunications. The increasing cross-linking of these industries blurs the lines – telecommunication being the tie beween the different segments. Thus, interbranch testing is a logical consequence and at the same time an entension of our expertise. Ultimately, our experience from the network tests is contributing to this as well. The independent, neutral and fair assessment of modern digital infrastructures is always predominant.

What was the focus of the new charging infrastructure test?
Motorists are used to getting from A to B without anxiously looking at the level meter. Thus, for the acceptance of e-mobility, a reliable charging infrastructure with a comprehensive coverage of charging stations is an indispensable requirement. In addition to locations and functionality, we have considered many more factors around the stations. For example: Is there a free WiFi available in order to use the apps also without mobile coverage? Furthermore, the procedure of charging should be designed as user-friendly and as easy as possible. Part of this is price transparency, payment options for ad-hoc charging and not least user-friendly apps.

How do you assess the results?
For a technology which is still emerging, the results are all in all pleasing. But they show still room for improvements. This is also true for the providers which have earned a good grade in our assessment. From our experience from the mobile network tests, operators see such independent tests as a stimulus to further enhance their infrastructure and optimize their offerings to the advantage of the customers and users.

What is your stance about the future of electric mobility? Which challenges must be met?
The future of electric mobility has already begun, e-mobility is leaving its mark on our cityscapes. In addition to obvious challenges such as range and the availability of charging stations, numerous additional factors are equally important for a future success. For example, the growing interconnectedness requires investments in the buildup of key technologies such as 5G. The smart car communicates with other cars, and increasingly also with the infrastructure such as charging stations. At this point, the aspect of the data transports' security plays a decisive role. All of this leads to the vanishing of classic borders between various industries and different applications. Be it 5G, the connected car, e-mobiliy or security: With our cross-sectoral know-how, we keep our eyes on all important factors and want to actively shape the future of e-mobilty. In order to achieve this, we offer end-to-end engineering, consulting and management services for topics such as batteries, vehicles, charging infrastructure and the entire eco system.

What are the future plans?
We would like to analyze and assess the charging infrastructure all over Europe. Above that, we examine the connectivity in vehicles, trains and airplanes – the keywords are Connected Car and Inflight Connectivity. And of course we also continue to develop our network tests.

Ready for the future of mobilty: connect and umlaut are already planning their next tests of the charging infrastructure.

CHARGE POINT OPERATORS

Ionity

The joint project of various well-known car makers speedily approaches its aim to establish a European fast charging network. And the quality is right too – most of the times.

▶ BMW, Ford, Mercedes-Benz and Volkswagen with its brands Audi and Porsche – the list of founders of Ionity looks like a Who is who of the automotive sector. Their mission: building a Europe-wide network of High Power Charging stations. By the end of 2020, the network is supposed to span 18 countries, with a distance of no more than 120 kilometers between any two stations. Our tests confirm that the company can be proud of the already existing offerings – although there is room for improvement in some details such as roofing or the marking of parking spots which are reserved exclusively for charging. Also when it comes to payment options, Ionity could put its offerings up a notch. But all in all, the service is convincing already today.

Modern and informative – but in terms of roofing, Ionity could still improve.

connect verdict: good (810 points)

Fastned

Green electricity, pleasantly designed locations and a competent hotline earn this dutch provider the sympathy vote. But there are also some aspects to critizise.

▶ The dutch company aims at building a network of 1000 fast charging stations in Europe, which runs completely on renewable energy. At the time of testing, 15 stations with 28 charge points were available in Germany, supporting wattages of 150 kW or more. Illumination and roofing made a good impression, regarding signage and marking the parking spots, Fastned might still up the ante a little bit. It was not possible to use the stations with the EMP apps which we had intended to use in our tests – before being able to start charging, the testers had to install Fastned's own app. However, we found the operation of the charging stations compelling – although here too, some more information during charging would be nice. The hotline deserves kudos, but ad-hoc charging left some room for improvement.


Likeable: Illumination and roofing are strong points of Fastned's stations.

connect verdict: satisfactory (658 points)

EnBW

Regarding the number of High Power Charging points, the Baden-Wuerttemberg utility company makes the second place in our comparison. Overall, the charging experience looks good as well.

▶ As already mentioned in the "E-Mobility Providers" category, the Baden-Wuerttemberg-based utility company operates a dense network of charging stations primarily in its own federal state – including 194 High Power Charging Points at the time of writing. The locations that were considered in our tests could offer somewhat better signage, and a roofing would be welcome too. But when it comes to usability and functionalilty of the charging stations, EnBW gathers a lot of points. The stations' displays provide a multitude of useful information during charging as well. The service is right too, and the pricing information leaves equally no cause for complaint. What we still would find nice, would be a somewhat wider choice of payment options and overall a little more convenience around the actual charging process.


Informative: EnBW's stations do not skinp on infos, but some displays could be more readable.

connect verdict: good (757 points)

Allego

All locations which the testers headed for were well hidden – and some of them did not even work when they had arrived there. This may be bad luck – but also leaves room for improvement.

▶ Allego, which is also based in the Netherlands, builds a charging network with numerous stations in the Netherlands, Belgium and Germany. This includes the proud number of 126 High Power Charging points in Germany – which makes Allego rank third in this discipline behind Ionity and EnBW in our competition. However, the testers could not issue top grades for signage, illumination or roofing for the considered charging points. Above that, it would have been hard to find the locations without satnav support – and many of them just did no work during the test stops. Additional shortcomings were identified in the areas of usability and price communication. Although its phone number was barely readable on the stations, the hotline made an overall good impression.

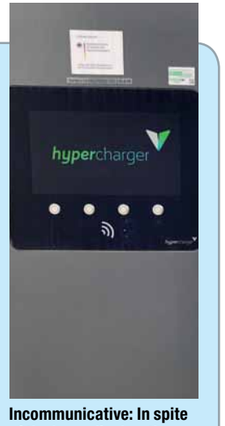

Peculiar: At this station, the charging cable is clamped between the information signs.

connect verdict: sufficient (532 points)

E-Wald

You have to look hard for the charging stations of this Bavarian provider, which are often hidden in industrial parks. The testers also found room on the upside regarding usability and convenience.

▶ The Provider who is based in Teisnach, near the Bavarian Deggendorf has offerings from carsharing all the way up to charging networks and thus also offers a considerable amount of charging stations. However, the three locations on our test routes were hiden in industrial parks without any signage worth mentioning – devoid of satnav support, the testers would have barely found them. And the distances to the next restaurant, shop or restroom might be a little shorter too – furthermore, many of them only offer limited opening hours. When it comes to the station's operation, we have nothing to criticize. However, the display contents could be a little more informative. When we called E-Wald's hotline, Deutsche Bahn's carsharing service Flinkster took the call – but was able to help competently.



Incommunicative: In spite of the large display, there might be more information.

connect verdict: satisfactory (668 points)

E.ON

Thanks to the merger of E.ON with Innogy, this provider can now offer a big charging network. However, as we were only able to test one of its locations, this company takes part as an unofficial competitor.

▶ The Essen-based utility company got involved in the area of e-mobilty early. In March 2020, it absorbed its competitor Innogy – including Innogy's charging network. The now impressive offering thus spans 71 High Power Charging Points. However, at the time of preparing our test, we were only able to find one HPC location which came into consideration. This is why we included E.ON as an unofficial competitor in our comparison this time. When it comes to the features and the surroudings of the considered station, we have only minor suggestions for improvement. Especially the operation and use of the station was convincing – only the information displayed before and during charging might be more detailed. Also, we would like to see some additional payment options.


Nifty, but sparse: The cool-looking E.ON station might offer more information.

connect verdict: no rating

Methodology

umlaut

connect's and umlaut's first joint charging network test is based on numerous test drives with frequent charging stops, extensive practical tests and logging the charging experiences at location – as well as on additional research.

■ Our test focuses on High Power Charging (HPC) stations with a wattage of at least 150 KW. As our candidates, we chose the top charge point operators according to the overall number of their charging stations as published in the charge point register of the German Federal Network Agency (Bundesnetzagentur). For the electric mobility providers, we selected the three most popular vendors according to the "Charging Map Compass" of the e-mobility information platform emobly.

The test drives for our first charging network test were conducted between April 28th and June 2nd, 2020. The teams rotated between the two test vehicles Mercedes EQC and Porsche Taycan. Our test routes led from Munich to Aachen and back, while including purposeful detours for stopovers at some charging stations scheduled for testing. Our test routes were selected to facilitate eight charging stops per tour. The testers distributed these stops in such a way that they could assess three charging procedures for each tested charge point operator. (With the exception of E.ON, as we could only identify one feasible HPC charging location during the preparation phase of our test.)

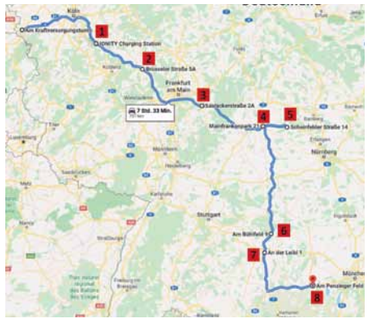
During the charging stops, we reviewed both ad-hoc charging (charging without using one of the electric mobility providers' apps) as well as prearranged charging and possibly pre-registration via the apps incorporated in the tests.

During charging, the testers filled out detailed checklists about the conditions at the charging spot, about the charging process itself and about possible errors. While charging, they also contacted the hotlines of the providers, in order to assess their service quality. If a technical error occured during charging, we switched to a different charge point of the same provider and repeated the attempt.

The assessment is based on the criteria in the tables belows as well as on different subitems. When assessing the electro mobilty providers, we also factored in the coverage of supported charge points in Germany. The according numbers were inquired in mid May from the press departments of the tested providers.

However, when assessing the charge point operators, we decided to abstain from scoring the number of supported charge points, as the tested companies have very different focal points in this regard: For example, Ionity focuses solitarily on HPC charge points alongside the autobahn, while utility companies such as E.ON or EnBW push the expansion of charging locations within their service areas.

By stages: The test routes were designed so that charging of the cars was possible and reasonable.



Optimized for charging stops: The routes included as many charge points as possible.

More than usual: The drivers interrupted their tours more frequently that e-car users would need to.

App-wise: As far as possible, the testers used the apps of the considered electro mobility providers.

Up to speed: During the charge stops, the teams filled out checklists and called the providers' hotlines.

Conclusion

Hannes Ruegheimer, connect author

Experienced e-car drivers will probably not be surprised by the results of this test: The apps from EnBW and Maingau as well as the charge points from Ionity and EnBW rightly have a good reputation. Still, both the winners of this test as well as as those providers who received the grade "good" still show room for improvement. This is even more applicable to the candidates who did not score quite as high. But as we have done for many years in the area of mobile communications, we also want to contribute with our charging network test to positively affecting the development in the marketplace to the benefit of the users.
We at connect and umlaut are a little proud about our first installment in this area. But considerations what we could still improve in the methodology and scope of out tests are already on their way. So stay tuned – as "after our charging network test" is at the same time "before our charging network test".

Results Electro Mobilty Providers

Provider / Offering	EnBW Mobility+	Maingau EinfachStromLaden	Telekom GetCharge*
Web	**www.enbw.com/elektromobilitaet**	**www.maingau-energie.de/e-mobilität**	**get-charge.com**
Number of supported Charge points in Germany: High Power (at least 150 kW) / DC / AC	224 / 3380 / 26 260	ca. 1000 / ca. 2900 / ca. 23 000	980 / 3610 / 16 983
App: Handling			
Available for Android/iOS	⊕/⊕	⊕/⊕	⊕/⊕
Level of Difficulty Operation	very easy	very easy	very easy
Tutorial / Charging Instructions	⊕/⊕	⊕/⊖	⊖/⊖
Map integration	⊕ (Apple Maps / Google Maps)	⊕ (Mapbox)	⊕ (Apple Maps / Google Maps)
Location nearby / Location available in route guidance	⊕/⊕	⊕/⊖	⊕/⊖
App: Functions			
Charge Point available or occupied: Real time info / Filter	⊕/⊕	⊕/⊕	⊕/⊖
Reservation / share address / Interface to onboard satnav	⊖/⊕/⊖	⊖/⊕/⊖	⊖/⊕(via map integration)/⊖
Filtering according to Wattage / Plug type	⊕/⊕	⊕/⊕	⊖/⊕
Info: Current Wattage / Charged kWh / Charging time / History	⊖/⊖/⊕/⊕	⊖/⊖/⊕/⊕	⊖/⊖/⊕/⊕
Payment/Price Transparency			
Price information before / during / after charging procedure	⊕/⊕(per kWh)/⊕	⊕/⊖/⊕	⊕/⊖/⊕
Clarity of pricing structure / Transparency of roaming	very good / price info, no roaming info	good / very good	very good / price info, no roaming info
Billing via credit card / SEPA direct debit / PayPal	⊕/⊕/⊖	⊕/⊕/⊖	⊖/⊕/⊖
Test Results			
Points Charge Point Coverage (max. 200)	**satisfactory (130)**	**very good (167)**	**very good (180)**
Points App Handling (max. 200)	**very good (180)**	**good (155)**	**satisfactory (130)**
Points App Functions (max. 300)	**good (235)**	**satisfactory (205)**	**sufficient (150)**
Points Payment/Price Transparency (max. 300)	**very good (285)**	**very good (255)**	**good (225)**
connect VERDICT max. 1000	**830 good**	**782 good**	**685 satisfactory**

Errors and omissions excepted * From July 1st, 2020: Alpiq Energie Deutschland GmbH

connect BEST IN TEST

connect BEST CHARGE POINT COVERAGE

Results Charge Point Operators

Provider / Offering	Ionity	EnBW	E-Wald	Fastned	Allego	E.ON
Web	**ionity.eu/de**	**www.enbw.com/elektromobilitaet**	**e-wald.eu**	**fastnedcharging.com/de**	**www.allego.eu/de-de**	**www.eon.de/de/pk/e-mobility.html**
Number of supported Charge points in Germany: High Power (at least 150 kW) / DC / AC	330 / – / –	194 / 731 / 2493	18 / 123 / 559	28 / 15 / 15	126 / 594 / 1052	71 / 1120 / 4900
Locations and Surroundings						
Signage / Illumination / Roofing	good / good / insuff.	satisf. / v. good / insuff.	insuff. / satisf. / insuff.	insuff. / v. good / v. good.	insuff. / satisf. / insuff.	good / v. good / v. good
Restroom / Restaurant / Shop, Kiosk nearby	v. good / v. good / good	good / good / v. good	satisf. / satisf. / satisf.	satisf. / good / satisf.	satisf. / satisf. / suff.	good / good / good
Free WiFi available	⊖	⊖	⊖	⊖	⊖	⊖
Charging Stations						
Operation / Placement / Display	v. good / v. good / v. good	v. good / v. good / good	v. good / good / good	v. good / satisf. / v. good	suff. / good / suff.	v. good / v. good / v. good
Info Wattage / Functionality / Scope of Information	v. good / v. good / v. good	v. good / v. good / v. good	insuff. / v. good / good	insuff. / satisf. / good	good / insuff. / good	insuff. / v. good / v. good
Signage / Parking spot designation / Size	v. good / insuff. / good	v. good / good / v. good	v. good / satisf. / v. good	insuff. / satisf. / v. good	v. good / insuff. / satisf.	v. good / v. good / v. good
Service/Hotline						
Hotline phone number visible at station / Costs	very good / very good	very good / very good	good / very good	very good / very good	good / very good	very good / very good
Multilingual / Availability / Access to errors	v. good / v. good / good	81 %	good / v. good / suff.	good / v. good / good	good / v. good / v. good	good / v. good / v. good
Payment						
Support for ad-hoc charging (without app)	very good	very good	very good	sufficient	sufficient	very good
Price information on Station on in the web	very good	very good	satisfactory	good	satisfactory	very good
Credit Card / Giro Pay / Apple Pay / Google Pay / PayPal	⊕/⊖/⊖/⊖/⊕	⊕/⊖/⊖/⊖/⊖	⊕/⊖/⊖/⊖/⊕	⊕/⊖/⊖/⊖/⊖	⊕/⊖/⊖/⊖/⊕	⊕/⊖/⊖/⊖/⊖
Test Results						
Points Locations/Surroundings (max.250)	**satisf. (167)**	**suff. (145)**	**insuff. (100)**	**suff. (133)**	**insuff. (103)**	**satisf. (170)**
Points Charging Stations (max.350)	**very good (308)**	**very good (311)**	**good (281)**	**good (270)**	**suff. (188)**	**very good (325)**
Points Service (max.150)	**outst. (145)**	**very good (141)**	**good (117)**	**very good (140)**	**very good (134)**	**very good (140)**
Points Payment/Price transp. (max.250)	**good (190)**	**suff. (160)**	**satisf. (170)**	**insuff. (115)**	**insuff. (107)**	**suff. (130)**
connect VERDICT max. 1000	**810 good**	**757 good**	**668 satisfactory**	**658 satisfactory**	**532 sufficient**	**No Rating***

Errors and omissions excepted
* No connect verdict, as only one location could be tested

connect BEST IN TEST