For the fifth time we have taken a closer look at the quality of fast charging stations. This year, our test drives took us through seven countries – with France as the newest addition.

Full energy ahead

Electromobility made great steps ahead last year. In 2022, a total of 470,559 all-electric cars were newly registered in Germany – a record figure. However, this is accompanied by growing pressure on the charging infrastructure. As of July 1, 2023, the German Federal Network Agency reported 78,918 public normal charging points and 18,577 fast charging points. Compared to 2022 (55,570 normal charging points and 10,131 fast charging points), the increase is encouraging – but as the stock of e-cars grows even faster, the ratio of charging points to e-vehicles will deteriorate, and competition for free charging spots will continue to rise. Reliable information about the availability and operational readiness of charging points is more important than ever.

Focus on networking and convenience

The connection of charging points, vehicles and payment infrastructure is thus becoming even more important. Alongside the charging convenience, it is a key focus of our assessment of charging networks, which we carried out again this year in cooperation with our test partner umlaut. As in previous years, we distinguish between providers of charging apps and payment functions (EMP, electric mobility providers) and on-site charging point operators (CPOs). And as usual, we have again refined our test criteria this year. For example, we require EMPs to offer at least one tariff with a monthly cancellation period. We also took the download figures of the respective EMP apps as a basis to assess the providers' reach. This is why some of them have been dropped compared to the previous year. When evaluating the CPOs, we adapted the catalog of criteria even further to everyday e-mobility practice (see box "Methodology" further on).

In addition, the test drives no longer took us only through the DACH and Benelux countries, but also through the important neighboring country of France. And so now the curtain rises on this year's results from our test drivers.
**Hannes Rügheimer**

🇩🇪 GERMANY (EMP)

DKV   There is still room for improvement for this fuel and charging card provider.

The fuel card provider is also active as an EMP and offers a card that can be used for both charging and refueling. According to DKV, more than 500,000 charging points can be used – it was not possible to determine how many of these offer HPC (min. 150 kW). The associated DKV Mobility App is supposed to support finding and paying. However, umlaut's test drivers had problems with the real-time status of the stations and on-site authentication. Charging processes started via RFID card are not displayed in the app. The price information could also be easier to understand.
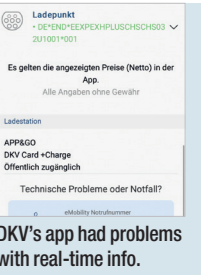
DKV's app had problems with real-time info.

connect VERDICT SATISFACTORY   (661 Points)

EnBW   The Baden-Württemberg-based utility company defends the first place among EMPs.

This year, EnBW again takes a confident first place among EMPs. Although tariffs have risen – as they have throughout the market – its offer is fair and clear. With the charging card, on which the corresponding offer of ADAC for its members is also based, a large number of charging points in Germany and abroad can be used without any problems – including Ionity stations. The app is mature and has nevertheless been continuously improved in recent years. Overall, the umlaut test drivers had plenty of reason to praise EnBW's app and charging card.
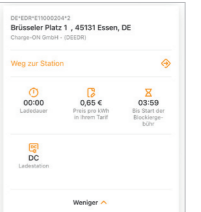
The EnBW app is intuitive and informative.

connect VERDICT VERY GOOD   (895 Points)

Maingau   The overall good offer would benefit from better real-time information.

Under the Maingau Autostrom brand, the energy supplier offers charging tariffs, cards and key fobs as well as an app. According to the provider, around 100,000 charging points in Germany and over 500,000 in Europe can be used, including Ionity. The pricing model is fair, and the app reliably guides users to the nearest charging station. In this year's test, however, umlaut drivers complained about problems with real-time infos: In some cases, access to the charging stations was not possible, and availability information or the display of the charging status was sometimes incorrect.
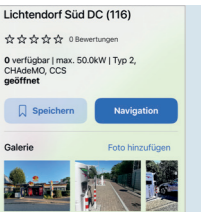
The well-made app needs more up-to-date info.

connect VERDICT GOOD   (797 Points)

Plugsurfing   App problems prevented a better rating for this EMP.

Electromobility provider Plugsurfing is establishing itself across Europe, supporting around 550,000 charging points in 27 countries with its backend network, charging tariffs and app. This includes 10,200 HPC charging points in Germany alone. The tariffs are not the cheapest in comparison, but they are clearly structured. On the test drives, however, there was some confusion when trying to use the charging points and to pay for charging. In some cases, information such as the operator of the station was also missing. However, the company plans to introduce a completely revised app soon, with which the observed problems should hopefully no longer occur.
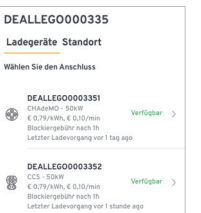
The app can sometimes confuse e-drivers.

connect VERDICT SATISFACTORY   (700 Points)

Shell Recharge   The shell app could do with a makeover.

By integrating the formerly independent charging card provider NewMotion, the mineral oil group is positioning itself for the e-mobility future. A fairly large number of charging points in Germany and abroad are supported, including Ionity. Access takes place via a charging card or key fob, and the pricing model is fair and understandable overall. The app offers a wide range of functions, but there were problems with its operation during the test drives. Above all, the umlaut testers missed real-time information about the ongoing charging process, including a notification when it is completed. Since this was also the case in previous years, an app update would be advisable.
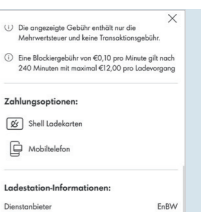
The Shell app offers several payment options.

connect VERDICT SATISFACTORY   (720 Points)

⊕SWITZERLAND (EMP)

Swisscharge The Swiss EMP's app would benefit from some fine-tuning.

The Swiss provider offers e-car drivers access to supported CPOs via app or RFID card. The network includes Swiss CPOs Agrola, GoFast and Socar, as well as independent charging station operators. Outside of Switzerland, however, major CPOs are missing. You should check the different costs in each case via the app before charging. During their charging stops, our test drivers did not always receive real-time information, and the current charging status is not transmitted either. In addition, design flaws, such as overlapping text fields, made using the app difficult. Photos of the charging stations of the networks own CPOs are a good feature – however, the app still could use some fine-tuning.
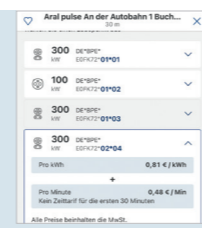
Despite basic info, the app could still improve.

connect VERDICT SUFFICIENT (605 Points)

Move Overall, the app and services of this Swiss EMP present a decent picture.

Move Mobility AG is a joint venture of the Swiss energy providers Alpiq, ewb, Groupe E and Primeo Energie. In addition to the charging stations of these owners, other CPOs in Switzerland and abroad are also supported. Identification at the charging stations takes place via the app or a key fob. The app is intuitive to use, although desirable features such as photos or ratings of the locations are missing. Real-time info during charging was available at least in some of the tested stations. Among the two Swiss EMPs we considered this year, Move clearly came out on top this time according to the verdict of the umlaut testers.

The Move app did not present any puzzles.

connect VERDICT SATISFACTORY (715 Points)

Technology: **Plug & Charge versus Autocharge**

Plug in, charge, and the payment takes place automatically - two different approaches are competing for this level of convenience.

"Plug & Charge," also defined as ISO standard 15118, is emanating primarily from the car manufacturers. It is therefore not surprising that the Ionity network, which is supported by a group of car manufacturers, was one of the first to implement this technology. EMPs and some CPOs, however, are reluctant to join in, fearing that automakers will compete with them for the billing business. That's why charging providers such as Fastned and EnBW took the initiative for the "Autocharge" alternative: The vehicle sends a unique ID via the charging cable that identifies the car and can be stored in the customer account at the charging provider. However, not all e-car manufacturers support this, and critics argue that Autocharge lacks encryption. Many CPOs are currently working on supporting one or both standards – charging stations can also serve both variants. Which one will prevail in the long term is still open.

Good idea, dispute over implementation: Payment data should also flow via the charging cable – but some of the players have different interests.

Technology: **Backend Connectivity**

For optimal planning and an optimal e-mobility experience, up-to-date and reliable data from charging stations is essential.

Is a charging station free or occupied, is it possibly defective? This kind of information is very important for e-car drivers – regardless of whether they receive it within an app or whether it is evaluated by the navigation system built into the e-car. For this purpose, charging stations report their status to the backend – i.e., the data center – of their operator. If this backend connection fails for whatever reason, this has negative consequences for the users. Therefore, the reliability of backend information is an important criterion in our test. If it is randomly disrupted at the time of testing, the resulting poor rating lies in the nature of a sample-based test.

Dependent: A charging strategy that takes into account the availability of charging points needs reliable real-time data from the stations on site.

Our test vehicle: BMW iX xDrive 50

BMW kindly provided us with a test car of its flagship electric SUV – offering a WLTP range of 633 km, it made a great impression.

The luxury electric SUV (from 107,900 euros) achieves a system output of 523 hp (385 kW) with its all-wheel drive and offers 765 Nm of torque. Our test drivers used the Model 50 with a net battery capacity of 109 kWh, which thus promises a WLTP range of 633 km. The BMW iX xDrive 50 accelerates from 0 to 100 km/h in 4.6 seconds, and its top speed is 200 km/h. This meant that the elegant e-car from Munich was ideally equipped for around 2200 kilometers of test drives throughout Germany. In the process, it offered plenty of convenience and played along smoothly at all charging stops.

The electric SUV from Munich is the current flagship among the electric BMWs. It provided joy of driving during the test routes.

RESULTS ELECTRIC MOBILITY PROVIDER (EMP) ACROSS COUNTRIES

Provider	EnBW	Maingau	Shell Recharge	Move	Plugsurfing	DKV	Swisscharge
Web	www.enbw.com/ elektromobilitaet	www. maingau-energie.de	shellrecharge.com/de-de	www.move.ch	plugsurfing.com	www.dkv-mobility.com	www.swisscharge.ch
Supported HPC charging points (min. 150 kW) in respective country*.	12 292	10 268	overall more than 500 000**	8681 in D, 1144 in CH	10 200	overall 509 000**	overall 85 526** in D, 10.673** in CH
APP OPERATION							
Available for Android / iOS / Support for Android Auto / Carplay	+ / + / + / +	+ / + / − / −	+ / + / + / +	+ / + / − / −	+ / + / − / −	+ / + / − / −	+ / + / − / −
Intuitive operation / Charging instructions	very good / +	very good / +	good / −	good / −	very good / −	satisfactory / −	very good / +
Overview of next locations	very good	very good	good	good	good	good	good
Rate / Favor sites / Site resentation with photos	− / + / partially	− / + / +	− / + / partially	− / + / −	− / + / −	− / + / −	− / + / +
APP FUNCTIONS							
Reliability of real time data	very good	very good	very good	good	very good	very good	very good
Filter by availability / charging perf. / origin of electricity / plug type	+ / + / − / +	+ / + / − / +	+ / + / − / +	+ / + / − / +	+ / + / − / +	+ / + / − / +	+ / + / − / +
Route planner / Navigation to charging point / Info about loc.	+ / + / very good	− / + / very good	+ / + / very good	− / + / very good	− / + / very good	+ / + / very good	− / + / very good
Real-time info charging power / charged kWh / charged time	+ / + / +	− / partially / +	− / + / +	− / − / +	− / − / +	− / − / +	− / − / +
PAYMENT / PRICE TRANSPARENCY							
Comprehensibility of prices / Distinction business-priv. / Export invoices (PDF)	very good / + / +	very good / business tariff / −	very good / − / +	very good / + / +	very good / − / +	very good / + / −	satisfactory / − / +
Price info before / during / after charging (history)	very good / limited / very good	very good / − / very good	very good / − / very good	very good / partially / very good	very good / − / very good	very good / − / very good	very good / − / very good
Payment via credit card / SEPA direct debit / other	+ / + / −	+ / + / −	+ / + / −	+ / + / −	+ / − / Apple, Google Pay	+ / − / Apple, Google Pay	+ / + / −
TEST RESULTS							
CHARGING POINT COVERAGE max. 40	40	40	30	10	40		30	20
APP OPERATION max. 180	160	170	90	105	115	75	150
APP FUNCTIONS max. 340	295	222	295	195	210	186	180
PRICE TRANSPARENCY/PAYMENT max. 440	400	365	305	405	335	370	255
connect VERDICT max. 1000	895 very good	797 good	720 satisfactory	715 satisfactory	700 satisfactory	661 satisfactory	605 sufficient

* according to information from EMPs and own research ** only combined information for AC/DC/HPC available

connect BEST IN TEST

🔴 GERMANY (CPO)

Test route Germany

The umlaut teams covered around 2200 kilometers in Germany.

The majority of all test drives were completed by umlaut's test teams between the end of July and the end of August 2023 – additional follow-up tests took place at the beginning of September. On the test routes through Germany, the BMW iX (see test vehicle description) was primarily used, supplemented by some test drives with the BYD Han towards Austria (see "Test route Austria"), with the Porsche Taycan 4S Cross Turismo on the way to Switzerland , and with the NIO ET7 on the journey for its test tours through the Netherlands and Luxembourg (see test route descriptions). The test drives in Germany alone added up to about 2200 km. The umlaut test teams

planned their route in such a way that five different locations were included in the evaluation of each of the German CPOs. During the charging stops, the teams filled out extensive questionnaires about the charging station, the charging process itself, as well as test calls to the providers' hotlines. For the EMP evaluation, they used the app of each assessed electric mobility provider whenever possible.
Since the CPOs Allego, Fastned, Ionity and Shell Recharge are active in several of the countries we tested, you will find their description in the "International" category – and the detailed results for Germany in the table below.

2200 kilometers across the country
The test drives through Germany were performed primarily in the BMW iX, but also in other cars from our test pool.

Aral Pulse Fast charging at the gas station - the concept is convincing and wins this time.

The BP brand is increasingly equipping its service stations with HPC charging stations. These are then located not only on highways, but also in city centers – useful if you want to charge up quickly there. According to the company's own figures, it had reached 1,211 charging points in September 2023, and plans for more than

5,000 by 2025. The concept benefits from the fact that a service station with a store, food and beverages, and vehicle-related services including a car wash is always next door. These good features plus a high level of information as well as problem-free processing during and after charging earn Aral Pulse this year's test victory among German CPOs.

Charging is available at more and more gas stations.

connect VERDICT **VERY GOOD** (868 Points)

E.ON The Essen-based charging network is growing – with varying levels of convenience.

The Essen-based energy company offers its customers home charging solutions, but also operates its own charging network, which includes a growing number of HPC charging points. In addition to its own charging card and the "E.ON Drive" app, the operator also supports various EMPs. For stations located at highway rest stops, the

associated convenience and service offering was good. Other E.ON charging stations, however, tend to be located far-off and then lack signage, weather protection, and other amenities. In Denmark, E.ON is currently experimenting with "dynamic pricing" – incentivized by discounts, charging should be better distributed throughout the day.

The level of comfort depends on the location.

connect VERDICT **SATISFATORY** (656 Points)

EnBW The Baden-Württemberg-based energy provider makes a very good CPO.

The rate of growth speaks for itself: Compared to the previous year, the number of HPC charging points operated by EnBW has nearly doubled – more than 100 charging parks offer eight or more fast charging points. And convenience is also developing further – for example, EnBW has set up a fully automated store in Bispingen on the edge of the

Lüneburg Heath in cooperation with the grocery chain Rewe as a pilot project. This trend is also confirmed by umlaut's test drivers. Overall, they report very good charging experiences at the test locations – both in terms of the charging process itself and also with regard to the ever more important surrounding services.

EnBW charging parks are a safe choice.

connect VERDICT **VERY GOOD** (851 Points)

EWE Go The convenience of charging near McDonalds restaurants can be increased.

At the subsidiary of the energy company responsible for operating the charging network, the number of HPC charging points has increased massively since the previous year – which is encouraging. In order to use them, e-mobilists can utilize EWE's own "Mobility Card," an app, or make the payment via other EMPs.

As part of a cooperation with McDonalds, many of the stations are located in parking lots of the fast-food restaurants. This invites people to take a break there – it's just a pity that these charging stations are hardly illuminated or protected from the weaather. Also, the cable management of the stations could be improved.

Cable management is often not optimal.

connect VERDICT **SATISFATORY** (693 Points)

RESULTS CHARGE POINT OPERATORS (CPO) GERMANY

Provider	Aral Pulse	EnBW	Ionity	Fastned	Shell Recharge	Allego		EWE Go	E.ON
Web	www.aral.de/de/global/retail/pulse	www.enbw.com/elektromobilitaet	ionity.eu/de	fastnedcharging.com/de	shellrecharge.com/de-de	www.allego.eu/de-de		www.ewe-go.de	www.eon.de/pk/e-mobility
Number of HPC charging points (min. 150 kW)*	1211	> 3000	555	189	680	732		1007	160
BEFORE CHARGING									
Signage / Illumination / Weather protection / Seating	↓/↑/↘/↓	↓/↓/↘/↘	↗/↗/↓/→	↓/↑/↗/↘	↘/↘/↓/↓	↘/→/↓/↓		↓/↗/↓/↓	↗/↘/↘/↘
WC / Restaurant, Snacks or Sale (vending machine) / Free WiFi	↑/↑/↘	↗/↑/↓	↑/↗/↓	→/↗/↓	↗/↗/→	→/↗/↓		↗/↑/↘	↗/→/↘
Parking Signage / Marking / Size	↑/↗/↑	↑/↑/↗	↗/↘/↑	↑/→/↑	↓/↗/↑	↑/→/↗		↑/↘/↑	↗/↘/↗
Service station / Security camera / Cleanliness / Trash cans	↑/↑/↑/↑	→/→/↑/↗	→/↓/↑/↗	↗/↘/↗/↑	↑/↗/↗/↑	↓/↘/↑/↗		↘/↓/↑/↑	↘/↘/↗/↗
DURING CHARGING									
Placement of station / Cable management / Readability of display	↑/→/↑	↗/↑/↑	↗/↑/↑	↑/↑/↑	↗/→/↑	↗/↗/↑		↑/↑/↑	→/↗/↑
Identification of station / Functionality / Noise emissions	↑/↑/↑	↑/↑/↑	↑/↑/↑	↑/↑/↑	↑/↑/↑	↑/↑/↑		↑/↑/↗	↑/↗/↑
Display: Current charging power / Charged kWh / Charged time	↑/↑/↑	↑/↑/↑	↑/↑/↑	↑/↑/↑	↑/↑/↑	↗/↗/↗		↑/↑/↑	↑/↑/↑
Price Transparency	very good	very good	very good	very good	satisfactory	good		satisfactory	satisfactory
Accessibility: Dimensions of parking sp. / of charging st. / Obstacles	↓/↓/↓	↓/↓/↗	↗/↓/↓	→/↓/↘	↓/→/→	↓/↓/↘		↓/↓/↘	↗/↓/↗
AFTER CHARGING									
Hotline: Number on station / Cost / Languages / Quality	↑/↑/↑/↑	↑/↑/↗/↑	↑/→/↑/↑	↑/↑/↗/↑	↑/↑/↗/↑	↑/↑/↗/↗		↑/↑/↓/↗	↑/↑/↗/↗
Payment: RFID / QR / Credit or debit card reader / Apple, Google Pay	⊕/⊕/⊕/⊕	⊕/⊕/⊖/⊕	⊕/⊕/⊖/⊕	⊕/⊕/⊕/⊕	⊕/⊕/⊕/⊕	⊕/⊖/partially/partially		⊕/⊕/⊖/⊕	⊕/⊕/⊕/⊕
Plug & Charge / Autocharge	⊕/–	–/⊕	⊕/–	–/⊕	–/–	–/–		–/–	–/–
TEST RESULTS									
BEFORE CHARGING max. 350	303	271	263	248	229	215		227	180
DURING CHARGING max. 380	327	345	342	344	277	336		289	253
AFTER CHARGING max. 270	238	235	220	222	233	159		177	223
connect VERDICT max. 1000	**868** very good	**851** very good	**825** good	**814** good	**739** satisfactory	**710** satisfactory		**693** satisfactory	**656** satisfactory

* according to information provided by CPOs and own research   Explanation of symbols: ↑ = very good; ↗ = good; → = satisfactory; ↘ = sufficient; ↓ = inadequate

Our test vehicle: BYD Han

For the first time, umlaut also used electric cars from Chinese production for its test drives. The BYD Han was fully convincing.

In the Executive Edition, the BYD Han (from 72,000 euros) not only offers all-wheel drive, but also plenty of convenience. And top driving performance as well: Its system output of 517 hp (380 kW) with 700 Nm of torque accelerates the elegant SUV from zero to one hundred in 3.9 seconds, and it is maxxed out at 180 km/h. With a battery capacity of 85 kWh, the WTLP range is 521 km.
On the tour that our test drivers completed with this vehicle, especially on the 1500 kilometers through Austria, it proved to be reliable and trouble-free, both when charging and driving.

New kid on the Block: The BYD Han electric SUV convinced umlaut's test drivers across the board. We would like to thank Autohaus Reisacher for for lending us this vehicle.

connect BEST IN TEST

INTERNATIONAL (CPO)

Ionity The joint venture of car manufacturers performs well – on two occasions even in first place.

Ionity is a joint venture of the car manufacturers BMW, Ford, Hyundai, Mercedes Benz and Volkswagen, including the Audi and Porsche brands. The company is getting closer to its goal of establishing a Europe-wide fast charging network: at the time of our test, it was operating a total of 1617 HPC charging stations in the countries we considered. And as the adjacent results show, the operator is represented in almost all of the countries visited by the umlaut test drivers this year.

It is great to see that Ionity is taking our criticism from previous years seriously – for example, the backend has been improved and the first of their stations are getting roofs. Overall, Ionity achieves good results; in Austria and Belgium, the operator even comes out on top in our comparison. In France, which was added as a new destination this year, Ionity comes in last, but at a high level overall.

connect VERDICT	GOOD	(825 Points)	🇩🇪
connect VERDICT	GOOD	(764 Points)	🇩🇪
connect VERDICT	GOOD	(802 Points)	🇨🇭
connect VERDICT	SATISFACTORY	(729 Points)	🇳🇱
connect VERDICT	GOOD	(849 Points)	🇧🇪
connect VERDICT	SATISFACTORY	(736 Points)	🇫🇷

Fastned With stations that make you feel good, Fastned achieves the grade "good" in five countries.

Fastned, based in the Netherlands, places particular emphasis on friendly and comfortable locations – this usually turns charging stops there into real recreational breaks. Signage, lighting and roofing are almost always available. The good service is complemented by the good conscience of charging with 100 percent green electricity. With currently at least 1,442 HPC charging points in Europe (no information was available for Austria and Luxembourg), the provider is also well on track

in terms of expansion. The umlaut test drivers were also impressed with their charging breaks at Fastned and attest to their high quality of stay. Especially in Germany, however, the support of more EMPs would be desirable. In the overall ranking, Fastned achieves first place in its home country, the Netherlands, and in Switzerland; the operator also achieves top list positions in other countries.

connect VERDICT	GOOD	(814 Points)	🇩🇪
connect VERDICT	GOOD	(822 Points)	🇨🇭
connect VERDICT	GOOD	(795 Points)	🇧🇪
connect VERDICT	GOOD	(813 Points)	🇳🇱
connect VERDICT	GOOD	(801 Points)	🇫🇷

Allego The Dutch provider scores in the midfield, but is committed to expansion.

The Netherlands-based provider is building a charging network in many European countries. It is particularly common in Germany, the Netherlands, Belgium and France. A large new charging hub with 32 fast charging points recently went into operation near Bielefeld, Germany, and a fast charging park at Frankfurt Airport with 22 HPC charging points is scheduled to follow in autumn. The umlaut test

drivers have visited Allego in Germany, Belgium as well as France and rank the evaluated stations in the midfield of the in-country comparisons in each case. Nevertheless, they note that there have been visible improvements compared to the previous year. Overall, however, the operator could still do a little better in terms of weather protection, free WiFi and, depending on the location, the services available on site.

| connect VERDICT | SATISFACTORY | (710 Points) | 🇩🇪 | connect VERDICT | SATISFACTORY | (685 Points) | 🇧🇪 | connect VERDICT | SATISFACTORY | (743 Points) | 🇫🇷 |

Shell Recharge The operator increases in charging point coverage and convenience.

The charging network NewMotion, which was bought by Shell, had its origins in the Netherlands but is expanding its presence throughout Europe. In Switzerland, the group took over the formerly independent operator EVpass. Shell is also integrating the charging of e-cars more intensively into the promotions at its fuel stations, for example with free hot drinks or with a reward for charged kWh in the bonus

programme "Clubsmart". However, by far not all of the charging locations can be found at fuel stations – and away from them there still can be a lack of weather protection and comfort offers. Nevertheless, Shell Recharge is making a real effort to improve convenience. In its home country, the Netherlands, the operator ranked second with a "good" rating, and in Germany and Austria it scores in the middle of the field.

| connect VERDICT | SATISFACTORY | (739 Points) | 🇩🇪 | connect VERDICT | SATISFACTORY | (672 Points) | 🇦🇹 | connect VERDICT | GOOD | (779 Points) | 🇳🇱 |

🇦🇹 AUSTRIA (CPO)

Test route Austria

The umlaut test teams completed the tours in the Alpine Republic mainly with the BYD Hanas as their test vehicle. The distance between the 30 charging stations visited in Austria (six candidates with five stations each) totalled around 1500 km.

Da emobil Apart from minor points of criticism, charging worked without a hitch.

The subsidiary of the two Tyrolean companies Fiegl + Spielberger and Gutmann still focuses on western Austria, but wants to expand its charging network to the entire Alpine Republic. It now comprises 70 of its own HPC charging points plus 195 that the company operates for third parties.

At least some of the stations visited by the umlaut test drivers are well signposted and protected from the weather, but free WiFi and a convincing charging cable management solution were missing. The basics of charging, on the other hand, worked without a hitch.

The surroundings depend much on the location.

| connect VERDICT | SATISFACTORY | (690 Points) |

EVN The testers still see potential for improvement at Energieversorgung Niederösterreich.

The abbreviation EVN stands for Energieversorgung Niederösterreich – Lower Austria Energy Supply. In this part of the Alpine Republic, the company is the largest energy provider. EVN operates its own charging stations with a focus on Lower Austria as well as Vienna – here, for example, all Spar and Hofer locations are to be equipped accordingly.

To use them, you can use an electricity charging card or an app, but also cooperations with various EMPs. The umlaut test drivers missed signposting, weather protection and free WiFi, and they noted a need for improvement in the charging cable management. Payment and service were okay, although they also still left room for improvement.

The cable management could be solved better.

| connect VERDICT | SUFFICIENT | (593 Points) |

Kelag The number of charging stations is growing - but the operator should improve the comfort.

The Carinthian-based energy service provider Kelag operates a charging network that included 28 HPC points at the time of the survey. Another 40 are to be installed by the end of 2023. The locations are partly near fuel stations, but also in the car parks of chain stores or fast food restaurants. The convenience offered on site thus depends on the res-

pective environment. At the locations visited by the umlaut test drivers, there was no weather protection and also no free WiFi. The use of the charging stations, on the other hand, worked well, and accessible charging was possible at some stations, in contrast to many of the other providers tested.

The charging experience has room for improvement.

| connect VERDICT | SATISFACTORY | (664 Points) |

Smatrics EnBW Some of the stations could use a little more convenience.

On the Austrian market, EnBW and Smatrics are cooperating in the CPO area. The charging network in the Alpine republic now includes 227 HPC charging points – all of which are powered by renewable energies, according to the company. In expanding its locations, the operator works together with retailers such as Bauhaus

and Billa, among others. In detail, the test drivers of umlaut missed signage, lighting, weather protection and free WiFi – and other comfort offers also depend on the respective location. However, there were no significant hurdles identified with the charging itself or around the billing process.

The charging stations correspond to those of EnBW.

| connect VERDICT | SATISFACTORY | (691 Points) |

⊕ SWITZERLAND (CPO)

Test route Switzerland

Around 1400 kilometres through Switzerland were the aim of the Porsche Taycan on this year's test drives.

For their test journey through Switzerland, our test drivers primarily used the Porsche Taycan 4S Cross Turismo.

Their sporty route led from Winterthur/Zurich to Bern and back with detours to Lake Constance and towards Liechtenstein – a total of around 1400 kilometres.

In addition to the CPOs Agrola, Go Fast and Move, the Swiss schedule also included Ionity and Fastned. The descriptions of these providers can be found in the chapter "International", the individual results are shows in the table at the bottom of this page.

To initiate the charging processes and to pay for it afterwards – and thus also to be able to assess the Swiss EMP offerings – the umlaut test drivers

mainly used the apps and e-mobility offers of Move and Swisscharge, plus ad-hoc payment options. In addition they used the German EMP solutions.

In the land of the Confederates
From stop to stop: Five CPO candidates, each with five visited stations, led to a total of 25 charging stops on the approximately 1400-kilometre Switzerland route.

Technology: Occupancy forecasts

AI and historical data can be used to estimate whether a charging station will be available on arrival.

E-car drivers who visit a charging station in order to recharge their car there, obviously have an interest in the station being available at the time of arrival. However, pre-booking is not an option for practical reasons – the

charging points would have to be secured against other users or blocked for them, and users who do not show up would hinder the concept. The alternative: Based on historical usage data, it is possible to predict quite

accurately what the utilisation will be like at a certain point in time. These AI-supported forecasts can be taken into account by navigation systems or apps when calculating the charging stops.

Agrola Despite conveniently accessible fuel station locations, there are some points of criticism.

Agrola is a Swiss energy service provider based in Winterthur. Increasingly, it also offers charging occasions at its fuel stations. This provides convenience basics such as WC, shopping or also offers for vehicle care. Depending on the location, aspects such as lighting and weather pro-

tection also benefit from the concept. However, the umlaut test drivers missed other criteria such as signposting of the charging stations, free WiFi or an indication of the maximum charging power on the charging points. Agrola should improve on these points if possible.

Info on max. charging power is missing.

connect VERDICT SUFFICIENT   (603 Points)

Go Fast The charging network, which is powered by green electricity, was largely convincing.

The Zurich-based company builds and operates its own fast charging network in Switzerland. According to the company, all charging points are supplied with 100 per cent green electricity. A large part of the HPC stations available in the Swisscharge network come from GoFast – but charging and billing via other EMPs is also supported. The

stations visited by umlaut's test drivers were convincing, at least in part, with good signage, lighting and weather protection. Whether there is a shop and restaurant nearby depends on the individual location. When it came to charging itself, everything went smoothly, and the billing process did not pose any hurdles worth mentioning either.

GoFast stations display everything important.

connect VERDICT GOOD   (786 Points)

Move Groupe E and Primeo Energie should improve some details at their charging points.

Behind the Move network, which also operates as an EMP, are the charging station operators Groupe E and Primeo Energie – depending on the location, the stations are operated by one of these two companies. The charging stations are located at motorway service stations, along other important roads or sometimes even somewhat off the beaten

track. Criteria such as signage, weather protection or other comfort features also depend on the respective location. Our test drivers did not find free WiFi at any of the charging stations they visited, and as with Agrola, the max charging capacity is not recognisable in advance. If these points of criticism were remedied, a better score would be possible.

Move also conceals the max charging power.

connect VERDICT SUFFICIENT   (632 Points)

Our test vehicle: Hyundai Ioniq 6

The elegant Korean proved its worth especially on the test drives in Belgium.

Despite its elegant appearance, the electric sedan is available from a relatively low 57,100 euros. With the 77.4 kWh battery version, it is absolutely suitable for long distances – the WLTP range is 614 km. The system power is 229 hp (168 kW), the torque 350 Nm. According to Hyundai, the rear-wheel drive car accelerates from 0 to 100 km/h in 7.4 seconds, with a top speed of 185 km/h. Thanks to its relatively modest power consumption, the Ioniq 6 completed the 900 km through Belgium in a relaxed manner.

Relaxed: The Hyundai Ioniq 6 is relatively modest in terms of both purchase price and consumption.

RESULTS CHARGE POINT OPERATORS (CPO) AUSTRIA AND SWITZERLAND

Provider	Ionity	Smatrics EnBW	Da emobil	Shell Recharge	Kelag	EVN		Fastned	Ionity	GoFast	Move	Agrola
Web	ionity.eu/de	smatrics.com/ladenetz	www.da-emobil.com	shellrecharge.com/de-de	www.kelag.at	www.evn.at/home/e-mobilitat		fastnedcharging.com/de	ionity.eu/de	www.gofast.swiss	www.move.ch	www.agrola.ch/de
Number of HPC charging points (min. 150 kW)*	110	227	70	86	28	in total 2450**		16	66	295	145	50
BEFORE CHARGING												
Signage / Illumination / Weather protection / Seating	→/↗/↓/↗	↓/→/↓/→	↘/→/↗/↘	↓/↑/↑/→	↘/↘/↓/↓	↓/↓/→/↓		↓/↑/↑/↑	↗/↑/↑/↘	→/↗/↗/→	→/↓/↓/→	↓/↗/↑/↓
WC / Restaurant, Snacks or Sale (vending machine) / Free WiFi	↑/↑/↓	↑/↗/↓	↘/↘/↓	↗/↗/↘	↘/→/↓	↘/↘/↓		↑/→/↓	↑/↑/↓	↗/→/↘	↗/→/↓	→/→/↓
Parking Signage / Marking / Size	↓/→/↗	↗/↓/↑	→/↘/↑	↑/→/↑	→/→/↑	→/↘/↗		↑/↑/↑	↗/↗/↗	↑/↑/↑	→/↑/↗	↑/→/→
Service station / Security camera / Cleanliness / Trash cans	↑/↓/↗/↑	↗/↘/↗/↓	→/→/↑/↘	↑/↑/↑/↑	↘/↓/↑/→	↘/↘/↑/↘		↓/↓/↑/↑	↓/↓/↑/↑	↘/↘/↑/↑	↓/↓/↘/↘	↑/→/↑/↑
DURING CHARGING												
Placement of station / Cable management / Readability of display	↑/↑/↑	→/↑/↑	↗/↑/↑	↗/↑/↑	→/↑/↑	→/↓/↗		↑/↑/↑	↗/↑/↗	↑/↑/↑	↘/→/↑	→/↑/↗
Identification of station / Functionality / Noise emissions	↑/↑/↗	↑/↑/↑	↑/↗/↑	↘/↘/↑	↑/↑/↑	↗/↑/↑		↑/↑/↑	↑/↗/↗	↑/↑/↗	↑/↗/↑	→/↑/→
Display: Current charging power / Charged kWh / Charged time	↑/↑/↑	→/→/→	↑/↑/↑	↑/↑/↑	↑/↑/↑	↑/↑/↑		↓/↑/↑	↑/↗/↑	↑/↑/↑	↑/↑/↑	↑/↑/↑
Price Transparency	very good	very good	very good	satisfactory	satisfactory	very good		satisfactory	very good	very good	very good	very good
Accessibility: Dimensions of parking sp. / of charging st. / Obstacles	↘/↓/↓	↓/↓/→	→/↓/↗	↓/↓/↗	↓/↓/↗	↓/↓/↗		↓/↓/↓	↓/↓/↓	→/↓/↓	↓/↓/↓	↓/↓/↓
AFTER CHARGING												
Hotline: Number on station / Cost / Languages / Quality	↗/↑/↑/↑	↑/↓/↗/↑	→/↑/↗/↑	↑/↗/↗/↑	→/↑/↗/↑	↑/↑/↗/→		↑/↗/↑/↑	↑/↗/↑/↑	↑/↗/↗/↑	↑/↑/↗/↑	↗/↑/↗/↗
Payment: RFID / QR / Credit or debit card reader / Apple, Google Pay	⊕/⊕/⊖/⊕	⊕/⊕/⊖/⊖	⊕/⊕/⊖/⊖	⊕/partially/⊘/⊕	⊕/⊕/⊖/⊖	⊕/⊕/⊖/⊖		⊕/⊕/⊕/⊖	⊕/⊕/⊖/⊕	⊕/⊕/⊖/partially.	⊕/⊕/⊖/⊖	⊕/partially/partially/⊖
Plug & Charge / Autocharge	⊕/–	–/⊕	⊕/–	–/–	–/–	–/–		–/⊕	⊕/–	–/–	–/–	–/–
TEST RESULTS												
BEFORE CHARGING max. 350	233	204	197	287	199	159		280	275	235	183	192
DURING CHARGING max. 380	316	283	287	207	286	267		305	306	351	267	266
AFTER CHARGING max. 270	215	204	206	178	179	167		237	221	200	182	145
connect VERDICT max. 1000	**764** good	**691** satisfactory	**690** satisfactory	**672** satisfactory	**664** satisfactory	**593** sufficient		**822** good	**802** good	**786** good	**632** satisfactory	**603** satisfactory

🔴 Austria   ⊕ Switzerland

* according to information provided by CPOs and own research ** only combined information for AC/DC/HPC available   Explanation of symbols: ↑ = very good; ↗ = good; → = satisfactory; ↘ = sufficient; ↓ = inadequate

NETHERLANDS AND LUXEMBOURG (CPO)

Test route Benelux

The three neighbouring countries were again on the route of our testers.

The Benelux countries were part of our test programme for the first time in 2021. This year, starting from umlaut's headquarters in Aachen, the test teams again visited charging stations in Belgium, the Netherlands and Luxembourg. They covered the approximately 1100 kilometres through the Netherlands and the approximately 200 kilometres through Luxembourg with the Nio ET7. For the approximately 900 kilometre test drive through Belgium, the Hyundai Ioniq 6 was used first and foremost. In the Netherlands, a total of six CPOs were tested: BP Pulse, E-Flux, Fastned, Ionity, Shell Recharge and Total Energies. In Luxembourg, the testers had Esso and Chargy stations on

their schedule. And in Belgium, they stopped at stations of Allego, Fastned, Ionity, Powerland and Total Energies.

The individual results from the Netherlands and Luxembourg can be found in the table at the bottom of this page, those for Belgium and also France on the following double page. The descriptions of the CPOs Fastned, Ionity and Shell Recharge, which are represented in several countries, are summarised in the chapter "International". And our comments on Total Energies, which is represented in the Netherlands, Belgium and France, can be read on the following double page in the chapter "Belgium and France".

Three-country triangle
The test tours also took the umlaut teams through Belgium, the Netherlands and Luxembourg.

Chargy There is still room for improvement with the Luxembourg "Superchargies".

Under the Chargy brand, the Luxembourg energy provider Creos operates a network of charging stations in its home country, which at the time of testing also included 44 fast chargers called "Supercharge". On their tour through the Grand Duchy, the umlaut test drivers visited five of these locations. The testers searched in vain for weather pro-

tection at all locations; and illumination usually had to be provided by the surrounding street lamps. Toilet stops typically led to nearby restaurants or petrol stations, at the Junglinster location also to a public pay toilet. The testers also found some room for improvement in the range of payment options actually available.

The locations provide only limited comfort.

connect VERDICT SATISFACTORY   (651 Points)

E-Flux This Dutch charging network operator has the greatest potential for improvement.

The provider E-Flux emerged from the e-mobility software company Road, which was founded in 2017. Its focus is on energy management and billing of charging solutions. These actually seem like ideal prerequisites for operating one's own charging network – but during their test drives through the Netherlands the umlaut test drivers came to the conclusion

that this provider had by far the greatest need for improvement: charging was simply not possible at several of the visited locations because the stations did not even appear in the EMP apps and ad hoc payment options were not reliably available. This is where the pronounced deficiencies in convenience and location features faded into the background.

Unfortunately, little went smoothly at E-Flux.

connect VERDICT INADEQUATE   (491 Points)

BP Pulse What is called "Aral Pulse" in Germany trades as "BP Pulse" in the Netherlands.

In the Netherlands, the British Petrol Group also offers charging points at its filling station locations – but there under the internationally used BP brand instead of Aral. However, the concept is the same as in Germany – the proximity to fuel stations ensures a basic range of convenience, consumption offers and vehicle-related services. While this

works convincingly in Germany and led to the CPO test victory there, in the Netherlands the umlaut test drivers report some potential for improvement. This starts with the features of the stations, continues in particular with a lack of price transparency and ends with the rather limited range of payment options.

The stations differ from the Aral variant.

connect VERDICT SATISFACTORY   (617 Points)

Esso In Luxembourg, the fuel station chain is already a little further ahead with its electrification.

Trivia fact: "Esso" is the trademark of the oil company Exxon Mobil in various European countries as well as Canada. Like BP/Aral, Shell and Total Energies, it is also preparing for a future in which mineral oil will become less important and electric mobility more. However, when planning its test routes, umlaut has so far only found a relevant number of

Esso stations with fast-charging points in Luxembourg. There, they presented an overall decent picture – the concept-related advantages such as the availability of refreshment facilities, toilets and car care offers also work in this case. Despite minor shortcomings, the offer is solid and the demanded price transparency was fulfilled.

In Luxembourg, you can also fill up with electricity at Esso.

connect VERDICT SATISFACTORY   (673 Points)

RESULTS CHARGE POINT OPERATORS (CPO) NETHERLANDS AND LUXEMBOURG

| Provider	Fastned	Shell Recharge	Ionity	Total Energies	BP Pulse	E-Flux		Esso	Chargy
					🇳🇱 Netherlands			🇱🇺 Luxembourg	
Web	fastnedcharging.com/nl	shellrecharge.com/nl-nl	ionity.eu	totalenergies.com	www.bp.com/nl_nl/netherlands	e-flux.io/nl		www.esso.lu	chargy.lu
Number of HPC charging points (min. 150 kW)*	869	> 500	44	n/a	104	k.A.		n/a	44
BEFORE CHARGING									
Signage / Illumination / Weather protection / Seating	↗/↑/↑/→	→/↑/↓/↘	↓/↘/↓/↘	→/→/↓/↘	↓/↑/↓/↓	↓/↑/↘/↓		↓/↑/↓/→	↗/→/↓/→
WC / Restaurant, Snacks or Sale (vending machine) / Free WiFi	↑/→/↘	↑/→/↗	↗/↗/→	→/↘/→	↘/↘/→	↘/↘/↓		↗/↗/↓	↗/→/↓
Parking Signage / Marking / Size	↑/→/↑	↑/→/↑	↘/→/↑	↑/↑/↑	↓/↑/↑	→/↘/↑		↘/→/↗	↑/↘/→
Service station / Security camera / Cleanliness / Trash cans	↗/↑/↑/→	↑/↑/↑/↑	→/↘/↗/→	↑/↗/↗/↑	↑/→/↑/↑	→/↘/↑/→		↗/↘/↗/↑	↑/↗/↗/↑
DURING CHARGING									
Placement of station / Cable management / Readability of display	↑/↑/↑	↑/↑/↑	↑/↗/→	↑/→/↑	↗/↑/↑	→/↑/↑		→/↗/↑	↑/↑/↑
Identification of station / Functionality / Noise emissions	→/↑/↘	↑/↗/↗	↑/↗/↑	→/↑/↑	→/↑/↑	↘/↗/↑		↑/↑/↑	→/↑/↗
Display: Current charging power / Charged kWh / Charged time	↑/↑/↘	↑/↑/↑	↑/↑/↑	↑/↑/↑	↑/↑/↑	↗/↗/↗		↑/↑/↑	↑/↗/↑
Price Transparency	very good	very good	very good	satisfactory	sufficient	sufficient		very good	very good
Accessibility: Dimensions of parking sp. / of charging st. / Obstacles	↗/↓/↘	→/↓/↓	↘/↓/↗	↗/↑/↓	→/↓/→	↗/↓/→		↓/↓/↑	↘/↓/↓
AFTER CHARGING									
Hotline: Number on station / Cost / Languages / Quality	↑/↑/↗/●	↑/↑/↑/↑	↑/↑/↑/↑	↑/↑/↑/↑	↑/↑/↑/↗	→/↑/↑/↑		↓/↓/↗/→	↗/↑/↗/↗
Payment.: RFID / QR / Credit or debit card reader / Apple, Google Pay	⊕ / ⊕ / partially / ⊖	⊕ / ⊕ / ⊕ / ⊕	⊕ / ⊕ / ⊖ / partially	⊕ / ⊕ / ⊖ / ⊖	⊕ / ⊖ / partially / ⊖	⊕ / partially / partially / ⊖		⊕ / ⊕ / ⊖ / ⊖	⊕ / ⊖ / partially / ⊖
Plug & Charge / Autocharge	– / ⊕	– / –	⊕ / –	– / –	– / –	– / –		– / –	– / –
TEST RESULTS									
BEFORE CHARGING max. 350	276	260	217	211	205	171		239	198
DURING CHARGING max. 380	307	304	302	267	244	177		324	316
AFTER CHARGING max. 270	212	215	210	205	168	143		110	137
connect VERDICT max. 1000	**795** good	**779** good	**729** satisfactory	**683** satisfactory	**617** satisfactory	**491** inadequate		**673** satisfactory	**651** satisfactory

* according to information provided by CPOs and own research   Explanation of symbols: ↑ = very good; ↗ = good; → = satisfactory; ↘ = sufficient; ↓ = inadequate

Our test vehicle: Porsche Taycan 4S Cross Turismo

This year, the Zuffenhausen-based company again supported us with a test vehicle – the Taycan 4S Cross Turismo electric sports car.

In addition to the basic model and the sister line Sport Turismo, Porsche's Taycan is available as a "Cross Turismo" with a sporty sedan feeling. The test car that the Zuffenhausen-based company provided to the umlaut team was the even sportier 4S: with 571 hp (420 kW) of "overboost" power and 650 Nm of torque, it accelerates from zero to one hundred in 4.1 seconds and continues to do so up to its top speed of 240 km/h. The battery, which is almost 84 kWh in net size, supplies power to the car. The nearly 84 kWh net battery delivers a WLTP range of 490 kilometres. All this is available from 114 222 euros. However, what the bare figures only reflect to a limited extent: The fun and fascination of experiencing driving a Porsche in the e-mobility world – the umlaut test teams had just that.
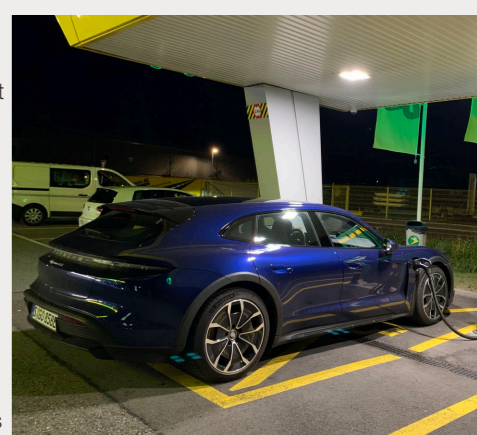
Sporty: The elegant but no less racy electric Porsche was a real eye-catcher, not only at its charging stops in Switzerland.
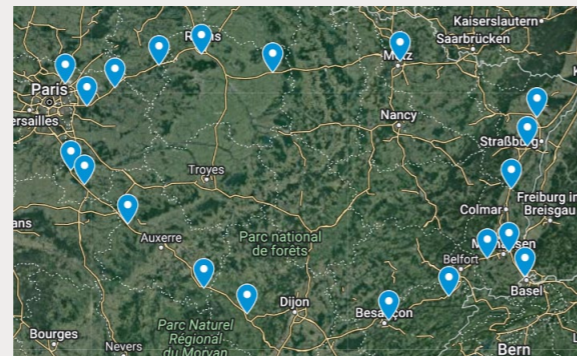
BELGIUM AND FRANCE (CPO)

Test route France

Vive la France – for the first time this year, the umlaut test teams also visited the big neighbouring country in the west.

Thanks to the close German-French friendship, the big neighbouring country is naturally a frequent destination for private as well as business e-car trips. That's why we added an extensive test tour through France to this year's test routes. And since most of the 1800 kilometres were covered in the iconic VW ID.Buzz, there was at least a bit of a holiday feeling coming along with the test tours.

Charging stops were planned at stations of Allego, Fastned, Ionity and Total Energies. Since the first three were also evaluated in other countries, you can find the corresponding comments in the chapter "International". The results of Total Energies, which umlaut also assessed in Belgium and the Netherlands in addition to France, can be found in the table at the bottom of this page.

Round trip through France
To Paris and back: Four candidates with five charging stations each make a total of 20 charging stops on the tour which started in Aachen.

Total Energies Three times the grade "good" in the Netherlands, Belgium and France.

The French mineral oil company has been called Total Energies since 2021 and also offers charging points for electric cars at its fuel stations, motorway service stations and independent locations in several countries. The umlaut test drivers tried out the offer in the Netherlands, Belgium and France and can award it the grade "good" in all three countries. The charging stations are usually sufficiently large and well signposted. The charging points located at fuel stations benefit from the services and comfort facilities

offered there. Motorway stops in France and the Netherlands also often were equipped with tables and benches as well as nearby kiosks and toilets. In the Netherlands and Belgium, there was occasionally even free WiFi. However, especially in France and Belgium, there were limitations regarding the payment options during our tests, because the "EasyPay" terminals provided per se were often out of order.

Neat space and clear performance specification.

connect VERDICT	GOOD	(795 Points)
connect VERDICT	GOOD	(813 Points)
connect VERDICT	GOOD	(801 Points)

Powerland The former charging point distributor should increase the comfort a bit.

Powerland, based in Poperinge, Belgium, is part of the petrol station operator Vandotec. It originally started as a distributor of charging stations, but now also operates its own charging network. As in previous years, the test drivers repeatedly encountered different types of charging stations on their tour through Belgium – so the operation and displays of the charging points also differed in detail.

What Powerland customers can expect to get thus depends on chance or actually on the specific location. Most of the test locations lacked weather protection and other conveniences; in many cases, only surrounding street lamps or neighbouring businesses provided illumination. The umlaut testers also report a need for improvement in terms of price transparency.

There was no criticism about this signage ...

connect VERDICT INADEQUATE (496 Points)

Our test vehicle: Nio ET7

Our test vehicle pool also included the NIO ET7. However, we did not try out its spectacular battery swap.

The ET7 is the flagship of the Chinese brand and delivers 653 hp (480 kW) and 850 Nm of torque. This translates into 3.8 seconds from zero to one hundred, with top speed set at 200 km/h. The larger battery version with 100 kWh used in the test offers a WLTP range of 580 km. This version is available from 90 900 euros. For 2024, Nio also announced a variant with a solid-state battery for a range of up to 1000 kilometres. A truly special feature is the "battery swap": as an alternative to charging the high-voltage battery, it is simply exchanged for a charged one. For this purpose, drivers rent the battery as part of a "Battery as a Service" model. The exchange during a road journey takes place in "Power Swap Stations", of which Nio currently operates seven in Germany. In the medium term, there are scheduled to be 50 stations in Germany alone. In the Swap Stations, which are roughly the size of a double garage, a robot carries out the exchange in about five minutes – up to 312 times per day. The removed batteries are then recharged in the storage area of the station. In this test, however, we did not make use of this option.

Flagship: The performance and convenience features of the Chinese brand's top model are impressive.

Innovative: In the "Power Swap Stations", an ET7 is implanted with a fully charged battery within five minutes.

RESULTS CHARGE POINT OPERATORS (CPO) BELGIUM AND FRANCE

Provider	Ionity	Fastned	Total Energies	Allego	Powerland		Total Energies	Fastned	Allego	Ionity
					Belgium					**France**
Web	ionity.eu/de	fastnedcharging.com/fr	totalenergies.com/fr	www.allego.eu/fr-fr	www.powerland.be/fr		totalenergies.com/fr	fastnedcharging.com/fr	www.allego.eu/fr-fr	ionity.eu
Number of HPC charging points (min. 150 kW)*	55	132	n/a	114	n/a		n/a	236	768	787
BEFORE CHARGING										
Signage / Illumination / Weather protection / Seating	↗/↘/↓/→	↓/↑/→/↘	↗/↑/↘/↓	↓/↘/↘/↓	↓/↘/↘/↓		↗/↑/↘/↓	→/↑/↑/↗	↘/↑/↘/↓	↗/↑/↘/→
WC / Restaurant, Snacks or Sale (vending machine) / Free WiFi	↑/↗/↓	↘/↘/↓	↑/↗/↓	→/→/↓	↘/↘/↓		↗/↑/↓	↑/↑/↗	↗/→/↓	↗/↗/→
Parking Signage / Marking / Size	↗/↑/↑	→/↗/↑	↓/↑/↗	↑/→/↑	↓/↑/↑		↗/→/↑	↓/↘/↑	→/↗/↑	→/→/↗
Service station / Security camera / Cleanliness / Trash cans	→/→/↑/↑	↓/→/↓/↓	↑/↑/→/↑	↘/↓/↑/↗	→/↘/↗/↑		↗/↘/↑/↑	↘/↓/↑/↑	↓/↓/↓/↓	↓/↘/↑/↑
DURING CHARGING										
Placement of station / Cable management / Readability of display	↑/↑/↑	↑/↑/↑	→/→/↑	↑/↑/↑	→/→/↑		↑/↑/↑	↑/↑/↑	↑/↑/↑	↑/↑/↗
Identification of station / Functionality / Noise emissions	↑/↑/→	↑/↑/↑	↑/↗/↑	↗/↑/↑	↓/↑/↑		→/↑/↑	→/↑/↑	↑/↑/↑	↑/↗/↑
Display: Current charging power / Charged kWh / Charged time	↑/↑/↑	↑/↑/↑	↑/↑/↑	↑/↑/↑	↑/↑/↑		↑/↑/↑	↑/↑/↑	↑/↑/↑	↗/↗/↗
Price Transparency	very good	very good	very good	very good	sufficient		very good	very good	very good	good
Accessibility: Dimensions of parking sp. / of charging st. / Obstacles	↑/↓/↑	↑/↓/→	↗/↓/↑	↑/↓/↘	↘/↑/↓		↑/↓/↑	↑/↓/↑	↑/↓/↑	↓/↓/↑
AFTER CHARGING										
Hotline: Number on station / Cost / Languages / Quality	↑/↑/↑/↑	↑/↑/↗/↑	↑/↑/↑/↑	↑/↘/→/→	↗/↓/↗/↗		↑/↑/↗/↗	↑/↑/↗/↗	↑/↑/↗/↗	↑/↑/↗/↗
Payment: RFID / QR / Credit or debit card reader / Apple, Google Pay	⊕/⊕/⊖/⊕	⊕/⊕/⊖/⊕	⊕/⊕/⊖/⊕	⊕/⊕/⊖/⊕	⊕/⊖/⊕/⊕		⊕/⊕/partially/⊖	⊕/⊖/⊘/⊖	⊕/⊖/⊖/⊕	⊕/⊕/⊖/⊕
Plug & Charge / Autocharge	⊕/–	–/⊕	–/⊕	–/–	–/–		–/–	–/⊕	–/–	⊕/–
TEST RESULTS										
BEFORE CHARGING max. 350	267	211	238	215	168		287	269	228	249
DURING CHARGING max. 380	347	349	308	330	190		353	346	359	277
AFTER CHARGING max. 270	235	253	230	140	138		201	186	156	210
connect VERDICT max. 1000	**849 good**	**813 good**	**776 good**	**685 satisfactory**	**496 inadequate**		**841 good**	**801 good**	**743 satisfactory**	**736 satisfactory**

* according to information provided by CPOs and own research   Explanation of symbols: ↑ = very good; ↗ = good; → = satisfactory; ↘ = sufficient; ↓ = inadequate

Our test vehicle: VW ID.Buzz

Hannes Rügheimer
connect author

When the opportunity arose to do some of the test driving with the electric successor to the legendary Bully van, we couldn't say no.

The design references to the much-loved classic are unmistakable. But under the bonnet, the ID.Buzz offers modern e-drive technology with 204 hp (150 kW) system output and 310 Nm torque. With zero to one hundred in 10.2 seconds and a top speed of 145 km/h, the ID.Buzz does not want to compete with high-performance electric SUVs or sedans – its domain is relaxed travelling with up to five passengers and a lot of luggage. With 77 kWh net battery capacity and a WLTP range of 423 kilometres, it can offer that. Our conclusion: this was a perfect match for our 1,800-kilometre test tour through France.

Savoir vivre: Travelling through France with the Bully successor - but in 2023 fully electric and with relaxed charging stops in between. Ça va bien!

METHODOLOGY

At every charging stop the umlaut testers made on their several thousand kilometre tour, they checked and recorded the charging technology, comfort and billing on site.

As in mobile communications, in charging infrastructure there are network operators (Charge Point Operators, CPO) – the actual operators of the charging points – and service providers (Electro Mobility Providers, EMP), who provide apps and billing platforms. Some candidates such as EnBW, Shell Recharge or Move fulfil both roles and thus were tested in both categories.

For the evaluation, umlaut's test teams undertook trips through Germany, Austria, Belgium, Switzerland, the Netherlands, Luxembourg and France. Depending on the size of the country, they visited four or five stations per CPO. Registration and billing took place on the one hand via the tested EMPs and on the other hand via the ad hoc payment options supported by the CPO.

During charging, the teams filled out extensive questionnaires about the conditions on site, the course of the charging process and any errors that occurred. They also contacted the providers' hotlines to test the quality of service. As usual in our network tests, the charging rates themselves are not subject of the evaluation.

This year, the evaluation methodology was also further developed and the weightings of the individual test points were adapted to everyday practice in e-mobility. In the CPO category, we thus have sorted the test criteria according to "before", "during" and "after charging" and added new test points such as barrier-free charging – the accessibility for e-drivers with physical limitations.

The overall impression counts: Our evaluation includes the signage and marking of the charging parking spaces, but also comfort and safety aspects such as lighting and camera surveillance.

A lot of charging practice: The test routes were designed in such a way that the test vehicles could be recharged as often as possible in a sensible manner.

In our evaluation of EMPs, EnBW is the clear leader in the test field for the fifth time in a row – despite stricter test criteria this year. But Maingau and, with minor restrictions, Shell Recharge as well as Move also deliver a convincing performance in this category. We would recommend the other EMP's to further develop their apps and payment functions soon.

In terms of CPOs in Germany, Aral Pulse overtakes EnBW, which had subscribed to the number one spot here in recent years – but both providers are very good.

In Austria, the two providers Ionity and Smatrics EnBW are ahead, in Switzerland Fastned, Ionity and GoFast.

In the Netherlands, the top candidates Fastned and Shell Recharge occupy the top places among the CPOs – followed by Ionity, which in turn scores ahead of Fastned and the French Total Energies in Belgium.

The latter leads in France ahead of Fastned and Allego. Finally, in Luxembourg, Esso is ahead.

Overall, we are pleased to see that some suppliers have taken our criticism from previous years seriously and introduced improvements. Another trend that can be seen this year is the growing involvement of the mineral oil companies. If they are equipping more and more of their fuel stations with fast charging occasions, this is good news for e-car drivers – especially for those customers who do not have their own wallbox but want to quickly charge their vehicle before a longer tour.