Service Benchmark

Final report

June 2021

Table of contents

NKL Program Charging without any surprises

In recent years the electrification of passenger transport has made good progress. To get and keep the private electric vehicle (EV) driver interested, it is essential that electric driving and charging are pleasant and reliable.

Under the slogan “Charging without any surprises”, we are aiming for more user-friendliness for EV drivers. We will start by developing a customer journey for public charging, a service benchmark for existing charging stations, a price transparency benchmark, and identifying the processes surrounding complaints, reports, monitoring, and compliance. Our goal is that by 2025, (public) charging will be a simple, everyday operation, just like filling up at a gas station is today. Together, we will boost the confidence of the growing group of (potential) EV drivers and facilitate the transition to electric transport.

To be able to measure the user-friendliness of public charging, a service benchmark will be carried out. For this study, we have selected the customer journey indicators that are important to EV drivers. Next, the most important indicators are accompanied by chosen sources of information to be able to measure user-friendliness. Like in the price transparency benchmark, we use objective data as much as possible in this study. User-friendliness can be substantiated with qualitative data by using input from the complaints and reporting process sub-project and possibly from EV user research.

The results of this project can be used to periodically carry out a service benchmark for existing public charging networks. The service design bureau in-Novation carried out the project at the request of NKL. This project is being conducted within the Nationale Agenda Laadinfrastructuur (NAL) (National Agenda for Charging Infrastructure - NACI) framework

The ‘Charging without surprises’-program consists of the following projects:

- Customer journey public charging (Dutch and English)
- Service Benchmark (Dutch and English)
- Price Transparency Benchmark (Dutch and English)
- Complaints and Reporting process (only in Dutch)
- Compliance and monitoring (only in Dutch)

Summary

We selected fifteen indicators for the service benchmark, which we can use to measure the user-friendliness of public charging stations. We chose a source of information or measurement method for each indicator to conduct a service benchmark in a standardized way. The method for this selection is as follows:

- Long list of 30 service indicators prepared by EV experts, procurement experts and refined with input from supply chain partners (including CPO (charging point operators), MSP (mobility service providers), NACI regions, VER[1]).
- The indicators are linked to the steps in the project 'Customer journey public charging', so that indicators are included for the entire process that the EV driver goes through.
- The 30 indicators from the long list are translated into survey questions. The purpose of the survey is to prioritize and short list the indicators.
- The survey was distributed to EV drivers, distinguishing between different user groups. This resulted in a short list of 15 indicators that include the preferences of all the different user groups.
- The research team selected sources of information and standard values to choose from for the 15 indicators that recur in the service benchmark. The team subsequently tested these sources of information and standard values with experts from the sector (including VER, MRAe and a CPO).
- The short list of 15 indicators and associated sources of information were tested through a broad market consultation among NACI regions, interest groups and market players. The responses have been interpreted by representatives of the supply chain partners. This resulted in the addition of one indicator: green energy

[1] VER: 'Vereniging Elektrische Rijders' (Association of EV Drivers)

Methodology for determining indicators

The scope of the service benchmark is an EV driver's customer journey when charging at a publicly accessible charging point.

1. A long list of indicators has been prepared by EV and procurement experts;
2. This long list has been refined with input from supply chain partners (including CPO, MSP, NACI regions and VER);
3. Subsequently, we compared the indicators to the seven steps from the Customer Journey Public Charging to cover the entire charging process of EV drivers.

Result:

Long list with 30 service indicators and related definitions of service.

Long list service indicators

For your information, below is an overview of all the indicators that were considered to be included in this service benchmark.

	Indicator	Definition of service
1	Maximum charging speed (regular chargers)	For regular charging stations: the charger or an app provides information about the maximum charging speed (or the charging capacity) of the respective charger.
2	Maximum charging speed (rapid chargers)	The rapid charger or an app provides information about the maximum charging speed (or the charging capacity) of the respective rapid charger.
3	Price transparency prior to a charging session	The charging station, an app or a website provides information in advance about the charging rate for the respective charger.
4	Construction of a charging rate	When the charging rate or costs are presented, it is made clear how they are constructed. For example, they may consist of a price per kWh, a price per time unit or a price per charging session.
5	Information about "smart charging"	The charger will inform, or refer to information, about whether "smart charging" is being used. Smart charging may make it take longer for vehicles to be fully charged.
6	User input for “smart charging”	If "smart charging" is applied, users can indicate how much their vehicle needs at least to be charged and in what time frame.
7	Information about "charging socially"	Information or references to information about the possible application of "social charging" are provided at the charging station. Socially charging will allow the charger to be better distributed among users.
8	Customer satisfaction	The charger or an app provides information about the customer satisfaction of the respective charger.
9	Location of chargers in apps	The location of the charger in an app corresponds exactly to the actual location. That allows the charger to be found easily.
10	Availability of chargers	The charger has a high degree of availability. If a driver wants to charge, they can do so almost all the time and the charger is not occupied by other users.
11	Availability in apps	An app or website provides information about the current availability of a charger.
12	Incorrectly parked fuel car	No non-electric vehicles are parked in spaces reserved for users of the charger.
13	Accessibility of a charger	Users can easily reach the charger. Once the vehicle is parked it is easy to connect the vehicle to the charger.
14	Available payment methods	The charger or an app provides information about which payment methods can be used for the respective charger. For example, a charging card, debit, or credit card.
15	Compatible charging cards	The charger, or an app provides information about which charging cards can be used at the respective charger.
16	Charger availability	The charger is reliable, which means that there is no malfunction and that it can be used without any problems.
17	User-friendliness of the charger	The charger is user-friendly. This means that it is easy to understand how to use the charging station and how to start and complete a successful charging session through clear instructions or without effort.
18	Information during a charging session	The charger or an app provides information during the charging session about the charging speed (energy) achieved and about the volume of the charge (kWh).
19	Price transparency during a charging session	The charger or an app provides information about how the costs for charging are developing.
20	Charging speed achieved	The charger or an ap provides information after the charging session about the average charging speed achieved (in other words the charging capacity) during the respective charging session.
21	Attractiveness of the charging location	For rapid chargers: the charging location is a pleasant place to stay during the charging session.
22	Services near the charging location	For rapid chargers: users of the charger can make use of various relevant services within walking distance of the charging station (e.g., catering, toilet, newsstand).
23	Helpdesk contact information	The charger provides information how users can reach the helpdesk if they have any questions or are experiencing problems charging.
24	Helpdesk availability	The helpdesk can always be reached.
25	Helpdesk expertise	Helpdesk staff demonstrate expertise in answering questions and resolving problems.
26	Follow-up by the helpdesk	Helpdesk staff adequately, correctly, and timely follows up on outstanding questions and problems.
27	Information directly after a charging session	On the charger or in an app, information is provided after the charging session about the total volume (kWh) of the charging session.
28	Price transparency directly after a charging session	On the charger or in an app, information is provided directly after the charging session, what the total costs are for the respective charging session. If applicable, the total charging costs are divided into separate price components.
29	Overview of charging sessions and costs	A total overview is provided that clearly shows which charging sessions have taken place and what the costs are, including cost breakdowns.
30	Verifiability of the invoice	The invoice for charging sessions is verifiable. It is comprehensible, complete, and sufficiently specific so that users can easily check it.

User research and broad market consultation

To prioritize the long list of indicators, we initiated a user survey among EV drivers. This was followed by a broad market consultation to test the support for the short list among the CPOs, MSPs and NAL regions.

- We translated the 30 indicators from the long list into survey questions
- 278 EV drivers participated in the user survey
- Number of EV drivers (PHEV & BEV) in the Netherlands: 280,000 (March 2021): 95% reliability, a margin of error 5.87%
- The differences in the type of EV driver in this study consisted of, among others:
  - Experience with electric driving
  - Range of the vehicle
  - Availability of private charging point
  - Drivers pay themselves vs employer pays

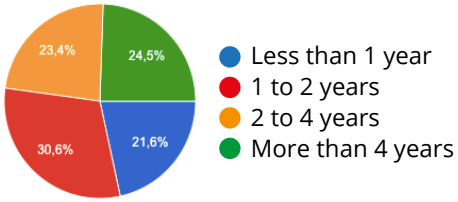
Result:

Short list with 15 service indicators, including the ten most important indicators from all user groups.

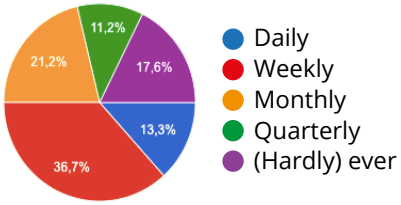
Result user research – cross section of user groups

- The respondents can be divided into various sub-groups;
- To arrive at a short list of service indicators, the 10 indicators that were found to be most important in the respective subgroup were taken from each sub-group;
- The short list of 15 indicators represents a cross-section of preferences across all user groups

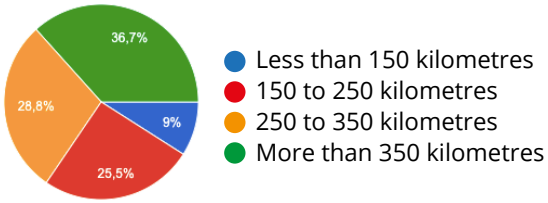
How long have you been driving an EV?



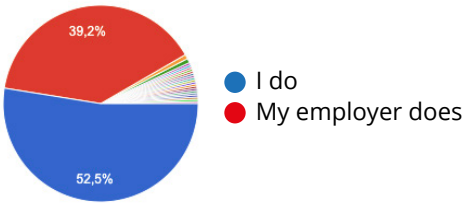
How often do you use a public charging station?



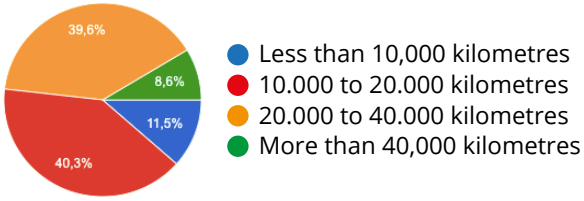
What is the range (reach) of your EV?



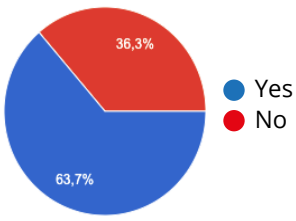
Who pays the charging costs?



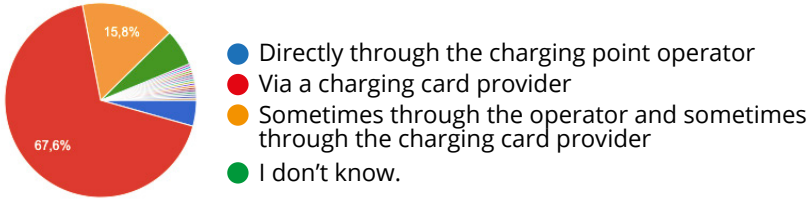
How many kilometres do you drive on average per year?



Do you have a private charging point that you can use exclusively?



Are the charging sessions paid directly through the charging point operator or through a charging card provider?



Result user research and broad market consultation – short list of 15 service indicators

The table below shows the short list of service indicators, which will be included in the benchmark. The number in the first column corresponds to the number in the long list

	Indicator	Definition of service
16	Charger availability	I can rely on the charger working correctly. This means it doesn't malfunction and I can easily use it.
12	Incorrectly parked fuel car	If I want to use the charger, I can, because it is not occupied by non-electric vehicles.
11	Availability in apps	If I want to use the charger, I can use the app or website to see if it is occupied by another EV.
9	Location of chargers in apps	The location of the charger in an app is exactly the same as the actual charger.
10	Charger availability	If I want to use a charger, I can, because it is not being occupied by another EV.
24	Helpdesk availability	I can always reach the helpdesk.
25	Helpdesk expertise	Helpdesk staff demonstrate expertise in answering my questions and resolving problems.
23	Contact information of the helpdesk	The charger provides information how I can reach the helpdesk if I have any questions or are experiencing problems when using the charger.
17	User-friendliness of the charger	The charger is user-friendly. This means that it is easy to understand how to use the charging station and how to start and complete a successful charging session through clear instructions or without effort
13	Accessibility of the charger	I can easily reach the charger. Once I've parked the vehicle it is easy to connect the charging cable to the vehicle and the charger.
30	Verifiability of the invoice	The invoice for my charging sessions is verifiable. This means it is comprehensible, complete, and sufficiently specific so that I can easily check to see it is in line with my actual charging sessions.
2	Maximum charging speed (rapid chargers)	On the rapid charger or in an app, I can find information about the maximum charging speed (or the charging capacity) of the rapid charger.
6	User input for "smart charging"	If "smart charging" is applied, I want to be able to specify in advance how much my vehicle at least needs to be charged and in what time frame.
3	Price transparency prior to a charging session	On the charger, in an app or on a website, I can find the charging rate prior to a charging session.
15	Green energy	The power supplied by the charging station comes from sustainable sources, originating from Dutch soil.

Link with the Customer Journey public charging (1/2)

Below, the indicators of the long list are linked to the steps of the Customer Journey Public Charging. Some indicators play a role in several steps of the customer journey. The number behind the indicator corresponds to the number of the indicator from the long list.

I look for a charger and plan a charging session	I drive to a charger	I find an available charger	I start charging	I wait and watch the progress	I stop the charging process (incl. payment)	I receive my invoice
• Maximum charging speed – AC (1) • Maximum charging speed rapid chargers (2) • Price transparency prior to a charging session (3) • Construction of the charging rate (4) • Position of chargers in apps (9) • Charger availability (10) • Availability is displayed in app (11)	• Position of chargers in apps (9)	• Charger availability (10) • Availability is displayed in app (11) • Incorrectly parked (fuel) car (12) • Accessibility of the charger (13) • Charger availability (16)	• Maximum charging speed rapid chargers (2) • Price transparency prior to a charging session (3) • Construction of the charging rate (4) • Information about over “smart charging” (5) • User input for “smart charging” (6) • Information about “charging socially” • Insight into customer satisfaction (8) • Information about available payment methods (14) • Compatible charging cards (15) • User-friendliness of the charger (17) • Helpdesk contact information (23) • Helpdesk availability (24) • Helpdesk expertise (25)	• Information about the session during charging (18) • Price transparency during charging (19) • Attractiveness of the rapid charging location (21) • Services in the vicinity of the rapid charging location (22) • Helpdesk contact information (23) • Helpdesk availability (24) • Helpdesk expertise (25) • Follow-up by the helpdesk (26)	• Charging speed achieved (20) • Helpdesk contact information (23) • Helpdesk availability (24) • Helpdesk expertise (25) • Follow-up by the helpdesk (26) • Information directly after a charging session (27) • Price transparency directly after a charging session (28) • Overview of charging costs (29)	• Verifiability of the invoice (30)

Link with the Customer Journey public charging (2/2)

The below table shows the 15 indicators of the short list **in bold.**

I look for a charger and plan a charging session	I drive to a charger	I find an available charger	I start charging	I wait and watch the progress	I stop the charging process (incl. payment)	I receive my invoice
• Maximum charging speed – AC (1) • **Maximum charging speed rapid chargers (2)** • **Price transparency prior to a charging session (3)** • Construction of the charging rate (4) • **Position of chargers in apps (9)** • **Charger availability (10)** • Availability is displayed in app (11)	• **Position of chargers in apps (9**	• **Charger availability (10)** • Availability is displayed in app (11) • **Incorrectly parked (fuel) car (12)** • **Accessibility of the charger (13)** • **Charger availability (16)**	• Maximum charging speed rapid chargers (2) • **Price transparency prior to a charging session (3)** • Construction of the charging rate (4) • Information about over "smart charging" (5) • **User input for "smart charging" (6)** • Information about "charging socially" • Insight into customer satisfaction (8) • Information about available payment methods (14) • **Compatible charging cards (15)** • **User-friendliness of the charger (17)** • **Helpdesk contact information (23)** • **Helpdesk availability (24)** • **Helpdesk expertise (25)**	• Information about the session during charging (18) • Price transparency during charging (19) • Attractiveness of the rapid charging location (21) • Services in the vicinity of the rapid charging location (22) • **Helpdesk contact information (23)** • **Helpdesk availability (24)** • **Helpdesk expertise (25)** • Follow-up by the helpdesk (26)	• Charging speed achieved (20) • **Helpdesk contact information (23)** • **Helpdesk availability (24)** • **Helpdesk expertise (25)** • **Follow-up by the helpdesk (26)** • Information directly after a charging session (27) • Price transparency directly after a charging session (28) • Overview of charging costs (29)	• **Verifiability of the invoice (30))**

Result user research and broad market consultation

The user survey and the broad market consultation yielded the following results:

- There are remarkable similarities between the top 10 indicators of the different user groups;
- For almost all groups of EV drivers, being able to rely on the correct operation of the charging station is an essential service indicator;
- Other indicators that are in the top 10 among users are: availability; charging station is not occupied by a fuel car; the location of the charging station is correctly displayed in apps; availability and accessibility of a knowledgeable helpdesk;
- Novice EV drivers value the user-friendliness of a charging station. More experienced EV drivers attach less importance to the presence of clear instructions on how to use the charging station;
- Price transparency is crucial for the subgroup of EV drivers who pay the charging costs themselves;
- The development of charging costs during the charging process is not in the top 10 most important indicators for any of the subgroups;
- The indicator 'compatible charging cards' is in the top 10 of the EV drivers who rarely charge publicly. Qualitative research shows that uncertainty about which cards drivers can use at charging stations is mainly an issue abroad or with foreign cards. This indicator is therefore not included in the Dutch benchmark.
- The green energy indicator was added (in italics) to the final list of key indicators from the broad market consultation.

To obtain the complete analysis of the results, please send an email to info@nklnederland.nl.

Methodology for selecting sources of information to measure the indicators

- We selected sources of information for the 15 indicators that recur in the service benchmark. The research team chose these sources of information and tested them with industry experts (including VER, MRAe and a CPO).
- To conduct the service benchmark as objectively as possible, it is preferable to use objective, hard data. In addition to existing datasets (e.g., hard data on uptime and availability), we need experimental research through sampling to measure the user level.
- Hard data is available for two indicators. Seven indicators require sampling.
- One indicator has no source of information available and requires user research. For the remaining indicators, user research is 'nice to have'.
- For two of the 15 indicators, the source of information is derived from the price transparency benchmark.
- The short list of 15 indicators, the corresponding service definition, and the source of information with which the indicator can be measured are shown in the table on the next page.

Source of information for important indicators

For each indicator, the source of information used to determine the service level is shown below.

	Indicator	Source of information
16	Charger availability	Desk research: uptime data from data source by CPO or concession provider
12	Incorrectly parked fuel car	No source of information available yet. Scoring, standard value and calculation to follow from the subproject complaints and reporting process.
11	Availability in apps	On-site sampling: Does the actual status of a charging station match the information in the CPO/MSPs apps and how often is this information updated?
9	Location of chargers in apps	On-site sampling of via Cyclomedia: Does the actual status of a charging station match the marker in the CPO/MSPs apps?
10	Charger availability	Availability data from CPO or concession provider's data source
24	Helpdesk availability	(On-site) sampling: What is the accessibility and waiting time of the helpdesk at any given time?
25	Helpdesk expertise	(On-site) sampling: Does the helpdesk employee make a knowledgeable impression. Problem solving ability of the helpdesk.
23	Contact information of the helpdesk	On-site sampling: Is the helpdesk's contact information available on the charger (through stickers or on screen)?
17	User-friendliness of the charger	On-site sampling: Are the user instructions made available on the charger, are they clear and is the charger user-friendly?
13	Accessibility of the charger	User research: Scoring, standard value, and calculation to follow from subproject Complaints and Reporting process.
30	Verifiability of the invoice	To follow from the Price transparency benchmark.
2	Maximum charging speed (rapid chargers)	On-site sampling: is the maximum charging energy displayed on the charger (on a sticker or screen)
6	User input for "smart charging"	Desk research: can users provide input via the CPO/MSPs apps for a "smart charging" session?
3	Price transparency prior to a charging session	To follow from the Price transparency benchmark.
15	Green energy	Guarantee of Origin (GoO) gives insight into the source of the energy supplied.

Standard value and score

The scoring methodology used to measure service levels is shown in the table below.
This scoring methodology has been tested with industry experts (including. VER, MRAe and a CPO).

	Indicator	Score	Standard value	Calculation: How do you arrive at a score?	Remarks
16	Charger availability	Uptime percentage per month (%)	99%	Per month (720 hours), an average charging station in the charging network may have 7.2 hours of downtime, calculated over the last 6 months	99% is also the percentage required in concessions for public charging stations.
12	Incorrectly parked fuel car	No source of information available yet. Scoring, standard value and calculation to follow from the subproject complaints and reporting process.			
11	Availability in apps	Grading (0-10)	7	5 points if the CPO app shows the correct status within 60 seconds (5/10 pts.) The apps of selected MSPs show the correct status within 60 seconds (5/10 pts., 1 pt. per 20% of MSPs)	On-site sampling: Does the actual status of a charging station match the information in the CPO/MSPs apps and how often is this information updated?
9	Location of chargers in apps	Grading (0-10)	7	• The CPO app shows the correct location of the loader (5/10 pts.) • The apps of selected MSPs show the correct location of the loader (5/10 pts., 1 pt. per 20% of MSPs selected for the benchmark)	On-site sampling: • Charging station should not deviate more than 5 meters. • Charging station must be visible on the app from the location..
10	Charger availability	Availability percentage (%)	Neutral value	Availability that is both too high and too low seems undesirable. A standard value depends on the policy followed in a region. Therefore, a neutral value is included in the benchmark, without assigning a value to it.	
24	Helpdesk availability	Grading (0-10)	7	Data related to the Helpdesk availability is not yet available. Data from CPOs or MSPs is not independent and not publicly available. For the time being, it could be tested via a sampling, measuring the waiting time. The recommendation for the helpdesk is to include clear KPIs in concessions.	
25	Helpdesk expertise	Grading (0-10)	7	Data related to the helpdesk's expertise is not yet available. Data from CPOs or MSPs is not independent and not publicly available. For the time being, expertise could be tested via a sampling, where an objective scenario is outlined. The benchmark administrator then assesses the Helpdesk expertise. The recommendation for the helpdesk is to include clear KPIs in concessions.	
23	Contact information of the helpdesk	Yes/no (share yes)	100%	At 100% of the charging stations in the sample, the contact information for the helpdesk is available	Concessions include a requirement that the number be visibly present on the charger post.
17	User-friendliness of the charger	Grading (0-10)	6	• User instructions are present on the charger • User instructions are clear • Charging station is easy to use. A charging session can be successfully started within 2 minutes.	User-friendliness is a subjective criterion. That is why measurable criteria must be established for implementation. Three criteria have been included to operationalize this indicator.
13	Accessibility of the charger	No source of information available yet. Scoring, standard value and calculation to follow from the subproject complaints and reporting process.			
30	Verifiability of the invoice	To follow from the Price transparency benchmark.			
2	Maximum charging speed (rapid chargers)	Grading (0-10)	6	The correct maximum theoretical energy of the rapid charger is shown on/in: • The charger (3/10 pts.) • The CPO app (2/10 pts.) • In apps of surveyed MSPs (5/10 pts., 1 pt. per 20% of MSPs)	This information can be enhanced by complaints and reports from EV drivers. An incorrect maximum charging capacity results in a lower grading. This is the theoretical maximum capacity: what can the rapid charger handle in combination with the grid connection. This is independent of the vehicle.
6	User input for “smart charging”	Grading (0-10)	6		
3	Price transparency prior to a charging session	To follow from the price transparency benchmark.			
15	Green energy	Grading (0-10)	6	• GoO from abroad is insufficient. • Minimum electricity from NL (6/10 pts.) • More points for locally generated electricity (8/10 points) • Direct link with, for example, solar panels (10/10 pts.)	CPOs can distinguish themselves by showing the origin of green energy.

Recommendations

- The characteristics of the EV market and its user groups are constantly evolving. There is a chance that the leading indicators of the service level experienced by users will change in the future. In time, new user research should show if and how key service indicators have changed.
- The service level at charging stations is improving. To stimulate this process permanently using the service benchmark, the standardisation of service indicators may eventually be adjusted. This will ensure that justice is done to the standard and the opportunities to improve the services further. New possibilities for data collection and storage (e.g., from the complaints and reporting process) can also be a reason to change how the service level is measured and standardised.
- Reliability is measured by the uptime percentage. It is essential to measure this percentage consistently. All measurable failures must be included.
- The user survey shows that a good helpdesk is a vital service indicator. However, tenders have not yet specified any KPIs that a helpdesk should meet. In the future, it is advisable to make agreements regarding accessibility (e.g., maximum waiting time) and the helpdesk's ability to solve problems.
- The indicator 'compatible charging cards' is in the top 10 of the group of EV drivers who rarely charge publicly. Qualitative research shows that uncertainty about which cards drivers can use at charging stations is mainly an issue abroad or with foreign cards. This indicator is therefore not included in the Dutch benchmark

Recommendations for implementation

- Determine which CPOs will be included in the benchmark and distinguish between indicators that only relate to rapid chargers.
- Determine which MSP apps will be included in the study (e.g., select the ten apps most used by EV drivers).
- For some indicators, it will be necessary to conduct sampling. This could possibly be undertaken concurrently with the price transparency benchmark, where charging stations are also visited.
- Determine the number of charging stations that need to be visited to conduct the sampling.

Appendices

Reliability of the charging station (#16)

Definition of service

The charging station is reliable, which means there are no malfunctions, and can be used without any problems.

Source(s) of information

Uptime percentage on grid level and on charger level.

Coordination of sources of information

- Agreements on uptime required. Uptime needs to be measured consistently, making it clear which failures are measured and which failures are not. All measurable failures must be included (e.g., the charging station cannot be used if chewing gum is in the socket). However, this is not automatically recorded. Optionally, this indicator can be supplemented with user information via complaints/reports.

Measurement method

Uptime data is requested from the concession provider or CPO:

- In the case of concessions, the concession holder owns the data. The concession holder can provide the raw data on uptime to conduct the benchmark.
- In the licensing model, the uptime data will have to be provided by the CPO.

Standard value

1. An average charging station in a charging network is allowed 7.2 hours of downtime per month (720 hours).
2. In this service benchmark, the uptime is calculated over the past six months. A high score can compensate a month with a low uptime score in other months.

Incorrectly parked (fuel) car (#12)

Definition of service

No other vehicles are parked in spaces reserved for users of the charging station.

Sources of information

1. User research (complaints and reporting EV drivers)
2. (Future option: parking sensors in parking space)

Coordination of sources of information

- Complaints and reporting: currently, we do not have any data available for this indicator. To carry out the benchmark, user reports of incorrectly parked fuel-driven cars will be necessary. Concession providers: how serious is the problem, and can the investment in a technical solution (parking sensors) be justified?
- Adequate enforcement affects the impact of this indicator on the overall service level. The city council is responsible for enforcement.

Standard value and measurement method

There is no source of information available yet to measure this indicator. The scoring, standard value and calculation will have to follow from the complaints and reporting process.

Example of measurement method

1. Ask users to actively report if non-electric vehicles are parked incorrectly at a charging station.
2. Placing sensors could be an option. These will report if a car is parked there. In combination with data from the charger, this can automatically report an unconnected vehicle.

Availability in apps (#11)

Definition of service

An app or website provides information about the current availability of a charging station.

Source(s) of information

1. The charging station itself: the current status
2. CPO app and/or website
3. MSP app and/or website

Coordination of sources of information

- To record accuracy, it is essential to update the information in the shortest possible time interval. The acceptable time interval is 60 seconds.
- CPO: what channels do they use to communicate status information to users.
- MSP: what channels do they use to communicate status information to users.

Measurement method

Determine actual on-site availability via on-site sampling and compare it to the status in the app/website of CPOs and MSPs.

1. Create CPO-app combinations (select the most-used user apps).
2. Check on location what the current status of the charging station is. Change the status by starting/stopping a charging session.
3. Check if the status is displayed correctly in the CPO app and MSP apps and/or websites (desired level: yes/no).

Standard value

Desired level: 7/10 points

Information is updated by CPO at least every 60 seconds. Desired minimum level: 7/10 points.

CPO app shows correct status: 5/10 points.

20% of MSP apps show correct status within 60 seconds: 1 point, 40% 2 points, etc. (max. 5/10 points)

Location of charging stations in apps (#9)

Definition of service

The location of the charger in an app corresponds exactly to the actual location. That will make it easy to find the charger.

Source(s) of information

1. The charging station itself: location at the charging site
2. CPO apps
3. MSP apps
4. Images by Cyclomedia
5. User research

Coordination of sources of information

The charging station should not deviate more than 5 meters from the location displayed in the app and should be visible from the location shown by the app.

Measurement method

Determine the actual situation via on-site sampling (possibly with Cyclomedia images) and compare it with the location information shown in the CPO and MSP apps.

1. Create CPO-app combinations (select the most-used user apps).
2. Determine (or use a Streetview program like Cyclomedia) the exact location of the charging station on-site.
3. Verify that the location in the CPO app meets the standard.
4. Ask users to actively report if the location of the charging station is not in line with reality (desired level: no reports).

Standard value

Desired level: 7/10 points

CPO app shows correct location: 5/10 points

20% of MSP apps show correct location: 1 point, 40% of MSP apps show the right location: 2 points, etc. (100% of MSP apps show right location: 5 points)

Availability of the charging station (#10)

Definition of service
The charger has a high degree of availability. If someone wants to charge, they almost always can, and other users are not occupying the charger.

Source(s) of information
Availability data from CPO or concession provider's data source

Coordination of sources of information
Concession providers: how do they determine availability, and what is a realistic target?

Standard value
A standard value is undesirable. We recommend applying a neutral value.

The availability rate is a good indicator of "sufficient service due to sufficient availability," but it doesn't cover it completely. We do not have an optimal availability percentage. From an individual user's point of view, 100% availability would be desirable, but for the city council (e.g., parking pressure) and the CPO (business case), it is not.

It is in the public's interest to have charging stations that are well utilized. We propose to use a neutral value in the benchmark. Based on the neutral value, a region/concession provider/CPO can carry out further research to determine whether the service is adequate. This can take place, for example, based on user reports. In addition, the analysis can be enhanced by looking at individual charging stations and nearby charging stations. It is not a problem if a charger is occupied a lot, if an available charger can be found nearby.

Each region may have different standard values based on its various charging policies. The benchmark administrator should take this into account.

Measurement method
1. Determine the charging network's availability. In the case of concessions, the concession holder owns the data.
2. Ask users to report if they feel the availability is insufficient.

Helpdesk availability (#24)

Definition of service
The helpdesk is always available.

Source(s) of information
1. Benchmark sampling
2. User research

Coordination of the sources of information
Data related to the Helpdesk availability is not yet available. Data from CPOs or MSPs is not independent and not publicly available. For the time being, it could be tested via a sampling, measuring the waiting time.

The recommendation for the helpdesk is to include clear KPIs in concessions.

Standard value
The helpdesk is available 24/7.

The waiting time is < 2 minutes.

Measurement method and desired level
1. Choose the helpdesks that are measured in the benchmark.
2. Call helpdesks at random moments and measure availability (desired level: yes/no) and waiting time (desired level: <1 min/>1 min)
3. Ask users to report it if they cannot reach the helpdesk (desired level: no reports).

Helpdesk expertise (#25)

Definition of service

Helpdesk staff demonstrate expertise in answering questions and resolving problems.

Source(s) of information

1. 1. Benchmark sampling
2. 2. User research

Coordination of sources of information

Data related to the helpdesk's expertise is not yet available. Data from CPOs or MSPs is not independent and not publicly available. For the time being, we could test expertise via a sampling and outline the ability to solve problems. The benchmark administrator could then assess the Helpdesk expertise.

The recommendation for the helpdesk is to include clear KPI's in concessions.

Measurement method and desired level

Expertise is subjective. It can be measured, however, by examining the problem-solving ability. Is the problem solved immediately after a phone call? We could outline a scenario in a sampling so that it leads to consistent results.

Establish how many charging sessions each CPO has investigated and which "malfunction" they presented to the helpdesk.

1. Assess the expertise of the helpdesk employee (desired level: good/satisfactory/unsatisfactory/bad).
2. Ask users if they are satisfied or dissatisfied with the helpdesk expertise employee.

Helpdesk contact information (#23)

Definition of service

The charging station provides information on how users can reach the helpdesk if they have any questions or are experiencing problems charging.

Source(s) of information

The charging station itself: stickers or HMI (Human Machine Interface).

Measurement method and desired level

Contact information for the helpdesk is available at 100% of the charging stations. This is a requirement of the concession providers (desired level: yes/no).

Standard value

100% of the charging stations provide the contact information. This is also a requirement of concession providers.

User-friendliness of the charging station (#17)

Definition of service

The charger is user-friendly. This means that it is easy to understand how to use the charger and how to start and complete a successful charging session through clear instructions or without effort.

Source(s) of information

Input by users would be preferred here. The scoring, standard value and calculation should result from the registration in the complaints and reporting process.

In the absence of a source of information, this indicator could be measured by sampling, but user-friendliness is a subjective criterion. That is why measurable criteria must be established for implementation. Three criteria have been included to operationalize this indicator.

1. User instructions are available on the charger.
2. User instructions are clear.
3. Charger is easy to use. A charging session can be successfully started within 2 minutes.

Measurement method and desired level

The following is established through on-site sampling:

1. Whether the helpdesk's contact information is made available on the charger or the display.
2. Whether the user instructions are clear
3. Whether a successful charging session can be started within two minutes

Standard value

Input by users would be preferred here. The scoring, standard value and calculation should result from the registration in the complaints and reporting process.

Accessibility of a charging station (#13)

Definition of service

Users can easily reach the charging station. Once the vehicle is parked normally, it is easy to connect it to the charging station.

Source(s) of information

1. Charger location on-site
2. User research

Coordination about sources of information

Since sampling in the benchmark is not an indicator for the average accessibility of charging stations, user research is preferred here. The scoring, standard value and calculation should result from the registration in the complaints and reporting process.

Measurement method and desired level

1. For the chargers included in the benchmark, we can determine whether they are positioned properly in relation to the parking spaces (desired level: yes/no).
2. Ask users to report it if they come across a charging station that they have trouble reaching when they park the vehicle correctly (desired level: no reports).

Standard level

The scoring, standard value and calculation should result from the registration in the complaints and reporting process.

Verifiability of the invoice

This is part of the price transparency benchmark, please refer to the report on price transparency.

Maximum charging speed – rapid chargers (#2)

Definition of service

The rapid charger or an app provides information about the maximum charging speed (or the charging capacity) of the respective rapid charger.

Source(s) of information

1. The rapid charger itself: stickers or the HMI
2. CPO apps
3. MSP apps
4. User research

Coordination about sources of information

CPO: how do we determine what the theoretical maximum charging speed is that we can compare with the communicated energy? Note that this does not depend on the vehicle used to charge.
User research can enhance the benchmark.

Measurement method and desired level

Include key CPOs for rapid chargers. Check the given number of rapid chargers. Check the charger itself, CPO apps and MSP apps.

1. 1. Three points: Check on-site whether the information is made available on the rapid charger or via a screen and whether it is correct (yes/no)
   - Is the information easy to find? (yes/no)
   - Is the information clear? (yes/no)
2. Two points: Check whether the information is made available in the CPO app (yes/no)
   - Is the information easy to find? (yes/no)
   - Is the information clear? (yes/no)
3. One point / 20% of MSP apps: Check whether the information is made available in MSP apps (yes/no)
   - Is the information easy to find? (yes/no)
   - Is the information clear? (yes/no)

Standard Value

Minimum of six points.

User input for “smart charging” (#6)

Definition of service

If “smart charging” is applied, users can indicate the minimum charge for their vehicle and the time frame required to do so.

Source(s) of information

1. CPO apps
2. MSP apps

Coordination about sources of information

- OCPI workgroup: What is the status of developments in this regard? When will functionality regarding smart charging become available, and in what form?
- CPOs: when do they want to roll this out, and in what form?
- MSPs: when do they want to roll this out, and in what form?

Measurement method and desired level

Only include this in the benchmark when “smart charging” starts playing an important role.

1. Check whether users can provide their input in the CPO app (desired level: yes/no)
2. Check whether users can provide their input in the MSP apps (desired level: yes/no)

Other

We have not yet widely implemented this functionality. That is why this indicator is only of minor importance in this benchmark unless we specifically check the charging stations equipped with the “smart charging” functionality.

As users indicated in the survey that they consider this an important indicator (they want to be “in control”), we expect this indicator to become more important in the future.

Price transparency prior to a charging session (#3)

This is part of the price transparency benchmark, please refer to the report on price transparency.

Green energy (#15)

Definition of service

The power supplied by the charging station comes from sustainable sources like sun and wind, originating from Dutch soil.

Background

This indicator was added to the service benchmark based on 'open' answers that EV drivers provided in the survey. Furthermore, in broad consultation, this indicator was mentioned as a valuable addition.

Other

Guarantee of Origin (GoO) provides insight into the source of the green energy supplied. Guarantee of Origin (GoO) is a digital certificate proving that energy has been generated sustainably. A GoO indicates where and how that amount of energy was generated sustainably in Europe.