



Price Transparency Benchmark



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1. Introduction

1.1. Reason

The Dutch National Climate Accord comprises more than 600 agreements to combat CO2 emissions. A significant part of these agreements relates to mobility. Electrification plays a central role in reducing emissions in the mobility domain. In recent years, the electrification of passenger transport, in particular, has made good progress. Despite the growth, there are still several obstacles to achieving further upscaling, where the Nationale Agenda Laadinfrastructuur (National Agenda for Charging Infrastructure - NACI) comes in. The objective is to allow the supply of charging infrastructure to grow in line with demand. Demand and supply for charging infrastructure are quantitative and involve issues such as geographical coverage, types of charging solutions, and quality. One of the obstacles that have been identified is the lack of price transparency at publicly accessible charging stations. The Price Transparency Research and Implementation Plan provided insight into this matter¹. Based on the recommendations from this research, we decided to include a Price Transparency Benchmark in NKL's "Charging Without Any Surprises" program.

In recent years, much of the Dutch growth in electric passenger transport has been driven by the number of corporate drivers or "lease car drivers". However, it is anticipated that there will be a considerable increase in the number of private electric drivers in The Netherlands in the years to come. To get and keep private electric vehicle drivers interested, it is essential that electric driving and charging are pleasant and reliable – without any surprises. A pleasant and reliable experience for consumers means that they know in advance what they are going to pay and that the invoice afterwards is accurate. This applies to consumers even more so than to corporate drivers because consumers are often more price-conscious and enjoy additional legal protection.

1.2. Objective

The price transparency benchmark stems from the objective in the NACI to make prices transparent for end users. The benchmark measures the price transparency for publicly accessible charging stations in the Netherlands. By conducting benchmarks, we aim to achieve the following sub-objectives:

1. To encourage supply chain partners to increase price transparency;
2. To provide insight to stakeholders on the development and status of price transparency;

Ultimately this should lead to electric vehicle (EV) drivers being able to make a price-based choice between the charging card and charging station that they use to charge an electric vehicle. However, the benchmark is limited to price transparency and does not address the quality or cost of the service. Thus, we assess price transparency but do not assess the price itself, charging power, or other service quality attributes.

Also, the benchmark is explicitly not intended to enforce agreements or rules. Nevertheless, identified risk areas could guide third-party enforcement.

¹ Price Transparency Research and Implementation Plan 2020, CE Delft and EV Consult, commissioned by NKL



Price transparency is a broad concept, and, in this context, the NACI Steering Committee developed a well-supported definition in the NKL report "Price Transparency Research and Implementation Plan". This definition can be broken down into several components where price transparency can be measured: Indication, Price, and Cost². We also work with four stages of price transparency: Beforehand, During, After completion and Invoicing. In this research method, we follow these components as a structure for registration and valuation.

By conducting the benchmark, we will gain insight into the level of price transparency in the Dutch electric vehicle charging market at any given time. As such, we are intelligently sampling the market to get insight into the level of transparency. The benchmark is by no means intended to be exhaustive. By choosing this method, the NACI Steering Committee aims to give a representative and objective picture of the current consumer market.

1.3. Consumer focus

Although most charging sessions currently take place primarily in the corporate market, this benchmark focuses on price transparency for consumers. Further on in this document, this is reflected in the selection of Mobility Service Providers (MSP), among other things. As described above, the emerging consumer market is essential for the increasing focus on price transparency. Possibly the chosen direction will raise questions about how representative the study is. Therefore, we will explain this choice in more detail below.

First, we must emphasize that the debate about price transparency is less relevant in the corporate sector. Employers usually pay the costs for charging. In that case, EV drivers hardly feel the price incentive, and as such, this will have less influence on their choice of a charging station.

When we look at employers, we find that they often purchase their charging services from the same party as the fuel card provider. This is in keeping with a market that remains accustomed to the higher cost of fuel vehicles. If a fuel vehicle travels an equal number of kilometres as an electric vehicle, this results in approximately 48% additional fuel costs³. Once a company opts for electric transport, this often reveals a substantial saving on energy costs. Differences between the costs of charging at different locations or with different cards are marginal compared to the much more substantial savings in energy costs resulting from the transition to electric driving.

The second reason this benchmark mainly focuses on the consumer market during the MSP selection is because the laws and regulations regarding price transparency for consumers are more stringent, for example, in the Decree on Product Pricing. This decree establishes definitions for "selling price" and "price per unit of measurement", which are concrete tools for testing the required price transparency. The legislation was put in place to protect the consumer, and companies are not necessarily bound by it.

The third reason is a practical one. Corporate charging cards are seldom freely available and consequently they are not freely available for this study. They are only issued with vehicles leased from one lease company or lease companies that have outsourced the provision of fuel cards. These are often supply chain partners that have added 'electric charging' as a functionality to their corporate mobility card.

² Figure 8 – Price Transparency Research and Implementation Plan, CE Delft and EV Consult, commissioned by NKL

³ RVO fuel comparison 1-10-2020



In practice, these mobility card providers enter into an agreement with an existing MSP who subsequently provides the 'chip' that allows the mobility card to be used as a charging card.

Incidentally, this choice of scope does not mean that the benchmark cannot be significant for the corporate market. One reason for this is that the most widely used corporate charging cards are those issued by the same providers as the charging cards used by consumers. Just like in the mobile phone industry, corporate and residential customers make phone calls on the same network. As a result, consumers use the same 'chip' for charging, with the only difference being that it is embedded in private charging cards. A benchmark of the consumer market, therefore, already reflects the corporate market.

This first national price transparency benchmark, therefore, focuses on the consumer market. If we repeat the benchmark, we may choose to expand the scope to the corporate market. In such a repetition, we could use the same or similar measurements to make a quick start.

1.4. Principles

The NACI calls for cooperation between the market and the government, and the benchmark will also have to be in line with this principle. Moreover, only a benchmark that motivates supply chain partners to work towards price transparency will ultimately benefit the end user, namely the electric vehicle driver.

Therefore, we apply the following principles in the preparation, execution, reporting and communication of the study:

Constructive dialogue

The benchmark aims to promote price transparency, which is best achieved when stakeholders are invited to make improvements, and the project team is open to feedback.

By being transparent about the research setup as much as possible, stakeholders are given the opportunity to contribute to the benchmark setup. A broad review ensures better quality and increased support for the benchmark and its methods. Also, the report offers stakeholders the opportunity to include a response.

Pre-standardization and instrumental implementation

As much as possible, we want to avoid that the method or manner of assessing price transparency is subject to discussion afterwards. Therefore, prior to the consultation stage, we establish the research design and determine how market participants' performance will be measured and reflected. To this end, we ensure the execution of tests and reporting is an instrumental execution of what is predetermined as much as possible.



Replicable

The value of the benchmark will be increased if it can be repeated. Not only can we compare the performances of the parties involved, but we can also follow the development over time. We ensure that the benchmark can be repeated similarly and efficiently by designing the benchmark transparently and implementing it instrumentally. In an evaluation at the end of the process, we will compile the lessons for a possible repetition.

1.5. Structure

This paper is the report of the Price Transparency Benchmark. A draft research method preceded the report and was adopted after a public consultation.

After this introduction, we continue in [Chapter 2](#) with a summary of the report for electric vehicle drivers. [Chapter 3](#) discusses the research method. Because the research method is already thoroughly described in a separate document, a summary will suffice here. [Chapter 4](#) is the key part of the report, where we present the results of the benchmark. In [Chapter 5](#), the direct stakeholders like charging point operators (CPOs), mobility service providers (MSPs) of EV drivers and NACI regions can respond to the survey results. The final chapter contains recommendations for a possible new benchmark, where we address the process, method, and implementation.



2. Summary for electric vehicle drivers

2.1. Introduction

To some extent, every electric vehicle driver depends on charging stations on the road or at home. We use rapid chargers, public or semi-public charging stations, along the highway or near our destination. There will always be a moment when a driver needs to charge their vehicle, and this electricity has a price. Although the first charging stations were installed in the Netherlands more than a decade ago, drivers often did not know upfront what a charging session would cost. This benchmark brings to light what the current level of price transparency is.

It seems that EV drivers still have relatively little interest in price transparency. We do not know whether that has to do with the fact that the charging card provided by the employer works everywhere or because the rates are relatively low compared to fossil fuels, but as the number of private EV drivers increases, this discussion becomes more relevant and topical.

For example, it is not always clear what the costs will be before a charging session, no matter what payment method is used. Moreover, sometimes the actual rate can only be found on the invoice afterwards. There are also charging stations where EV drivers can pay without a charging card and at the station's own rate, so-called ad-hoc charging. To help consumers make the right choice, providers must be transparent about their rates. The EV owner must have a choice in which charging station and charging card will best suit their situation. The price of charging is a significant aspect when making this choice.

"Do I want to charge here using my favourite provider's charging card, or would it be better to pay directly with my credit card?"

Price transparency is about clearly communicating the rates for a particular service before, during and after an event. This applies to charging stations on the street and charging stations along the highway or at businesses or stores.

For this study, we performed 1200 charging sessions at more than 100 different charging stations across the Netherlands. Are you, as an EV driver, informed in advance what exactly the rate will be? How do you find out, and does it differ between various providers? As an EV driver, do you have an easy way to find out what your charging session will cost? And afterwards: does your expectation correspond with what will eventually appear on your invoice?

This benchmark provides substantiated answers to all these kinds of questions. With this benchmark, we are trying to raise attention to price transparency and stimulate the market to continue paying attention to this issue. This is not only valuable for the sector but especially for those who ultimately have to pay for the charging sessions - the electric vehicle drivers.



The research results provide companies and governments that play a role in price transparency with insight into the sector's status, and they offer tools to improve price transparency in those areas where it is needed.

Dat is niet alleen waardevol voor de sector zélf, maar vooral voor diegene die de laadsessies uiteindelijk moeten betalen, de elektrische rijder dus.

2.2. Research results

The benchmark assigns scores to a charging session based on how good their price transparency is. This score runs from 0 to 10. The charging stations can earn points in different stages: price transparency before, during and immediately after, the invoicing and complexity. This is how we determine the score for the entire industry, for specific companies and particular topics.

Average score

The average score of the charging sessions was 6.3. The price information beforehand and the invoice afterwards were relatively good, but points were also missed here. For example, not all combinations of supply chain partners (19%) comply with the legal requirements regarding price transparency before charging.

In addition, the provision of information during charging and shortly after the charging session was below standard. For electric driving and charging to be enjoyable and reliable, the market must make further improvements and thus further improve price transparency.

Charging at businesses or stores

What stood out was that price transparency at the so-called semi-public charging stations - such as parking areas at businesses or stores - continued to lag behind the public charging stations, the charging stations in the street. Here, ad-hoc charging often also did not work yet. Even though semi-public charging stations - which are also publicly accessible - must comply with the same rules as public charging stations.

Price information at the charging station

Rates for charging are usually announced via the charging card provider's app or website. It is not common to see the (basic) rates displayed at the Dutch charging stations themselves. In 12.6% of cases, the (basic) rates were displayed directly at the charging station by a sticker or display. Many providers prefer to use a link or QR code to inform EV drivers about the price of charging.

Rapid charging

As for the topics 'information during or immediately after charging', we also discovered a significant difference between the rapid charging networks and the regular charging stations. We noticed that the rapid charging networks stand out favourably because they almost always have a display. Since there is no display at a regular Dutch charging station, it is more difficult for these operators. We also saw innovative solutions where they deployed an app that kept drivers precisely informed about their charging session.



Invoice

In almost all (98%) cases, the rates announced in advance corresponded to the invoiced rates. If a rate is mentioned, you can rely on it to be correct and that this is exactly the rate that you will be paying. This offers EV drivers clarity and confidence – they charge without surprises.

Ad-hoc charging

Ad-hoc charging means charging at a charging station without a charging card, for example by paying with a credit card. Ad-hoc charging has a lower price transparency than 'regular' charging. It is mandatory to offer ad-hoc charging. However, this was only possible at 42% of the charging stations. Also, only in 24% of the cases where the price was displayed was it possible to charge ad-hoc.



3. Summary Research Method

This section summarizes the research methods used for the price transparency benchmark. The full research method can be consulted in this [document](#) (only in Dutch).

3.1. Research setup

The first part aims to set up a sampling that is feasible and represents the Dutch consumer market. The selection methods for the CPOs and MSPs to be tested are essential in this respect. Adding too many CPOs or MSPs to the study would lead to a progressive growth in the number of tests. Therefore, we set criteria for the selection of the most representative supply chain partners.

In our CPO selection criteria, we distinguish between regular charging and rapid charging.

- The study looks at parties that operate more than 250 AC charging stations and therefore represent the market.
- In addition, the four largest DC charging station providers are included. Four parties operate about 78% of the approximately 450 rapid charging stations in the Netherlands.

The MSP selection criteria have a step-by-step approach:

- In the first step, charging cards were selected that:
 - Are offered through a Dutch language website;
 - Are freely available; we do not select any charging cards that can only be purchased in combination with another product or service;
- From the remaining charging cards, we then selected the 10 most requested on [laadpasTop10.nl](#).

In addition, we determined how many tests would be required to obtain a reliable research result in different situations. By default, we conducted four tests in a CPO-MSP combination. If a CPO has multiple pricing schemes, we increased this number to nine.

These selection steps resulted in the following distribution of charging sessions across CPO-MSP combinations:



Number of sessions per CPO-MSP combination															
	Charge Point Operators														
		Allego	EVNetNL	Engie	Greenflux	LasMileSolution	NewMotion	Vattenfall	Pitpoint	Shell Recharge	Fastned	Ionity	NewMotion	EV-Box	Eneco
Mobility Service Providers	ANWB	9	4	9	4	4	4	9	9	4	4	4	semi-public 15 15 15		
	CHARGEPOINT.COM	9	4	9	4	4	4	9	9	4	4	4	15 15 15		
	ECOTAP	9	4	9	4	4	4	9	9	4	4	4	15 15 15		
	ENECO	9	4	9	4	4	4	9	9	4	4	4	15 15 15		
	E-FLUX	9	4	9	4	4	4	9	9	4	4	4	15 15 15		
	EV-BOX	9	4	9	4	4	4	9	9	4	4	4	15 15 15		
	NEWMOTION/SHELL	9	4	9	4	4	4	9	9	4	4	4	15 15 15		
	PLUGSURFING	9	4	9	4	4	4	9	9	4	4	4	15 15 15		
	VATTENFALL	9	4	9	4	4	4	9	9	4	4	4	15 15 15		
	VANDEBRON	9	4	9	4	4	4	9	9	4	4	4	15 15 15		
	AD HOC	9	4	9	4	4	4	9	9	4	4	4	15 15 15		
	Total	99	44	99	44	44	44	99	99	44	44	44	165	165	165
No. of charging sessions	1199														
No. of unique charging stations	109														

To the extent possible, for testing and analysis we consider ad-hoc charging as a charging session where the CPO also acts as an MSP. In addition, we monitor which form of ad-hoc charging is applied:

- No ad-hoc charging
- Ad-hoc charging is possible, with registration
- Ad-hoc charging is possible, without additional registration



3.2. Data Collection

The data collection section of the research method describes what data is collected and how it is collected for each stage. There are four stages:

Before

This is the price information that is available before the charging session has started. The primary sources of information are public apps and websites, and we also record the price information displayed on site. In addition, at this stage, we record basic information like the location and time of the charging session. For ad-hoc charging, we record the information from the CPO's app or website; for MSP-charging we record the information from the MSP's app or website.

During

In the 'during' stage, we record what information is offered during the charging session. Information that is generally offered during the charging session is the charging session's duration, energy purchased (kWh), and cost.

After completion

This concerns the information offered after the charging session. Again, this usually involves duration, energy and/or costs. The information is usually offered via a display, app or by logging into an account on a web page. We also record the duration that the information is offered.

Invoicing

The invoice is issued a few weeks after the charging session. Based on the invoice, we record:

- invoice date;
- price;
- whether the price corresponds to what was previously advertised;
- whether the price is specified;
- and, given the specification chosen, whether it is possible to verify that the correct price has been paid.

Just like 'after completion', we also record when the information is provided for 'Invoicing'.

3.3. Data Processing

In this section, we describe how the recorded data is translated into a rating for price transparency. To arrive at the different scores, we first assign a score to each individual charging session. Then the sessions are added up and averaged per CPO-MSP combination. That results in this formula:

$$\frac{\text{(Score charging session 1 + Score charging session 2 + Score charging session 3 + etc.)}}{\text{Number of charging sessions (per CPO-MSP combination)}} = \text{score}$$



The score per charging session has been established as per the table below:

Score per charging session				
Beforehand (0-4)	During (0-1)	After completion (0-1) Within 1 hour (100% score) Within 24 hours (50% score)	Invoicing (0-3)	Complexity (0-1) (Number of price elements)
<p>A</p> <p>Rate in app/ website for specific charger Incl. VAT (3)</p> <p>Rate in app/ website for specific charger excl. VAT (3)</p> <p>Rate in app/ Website generic (1)</p>	<p>C</p> <p>kWh charged kilometres charged time and/or Price available via app or display (Yes/No) (0.5)</p>	<p>E</p> <p>kWh charged kilometres charged time and/or Price available app/display/ email/website/receipt (Yes/No) (0.5)</p>	<p>G</p> <p>In next month after charging transaction (Yes/No) (1)</p>	<p>J</p> <p>1-2 elements (1) 3 elements (0.5) 4+ elements – (0)</p>
<p>B</p> <p>Rate visible on charger incl. VAT and notification whether it concerns a CPO or MSP (1)</p> <p>Rate visible on charger incl. VAT and without notification whether it concerns a CPO or MSP (1)</p> <p><i>A notification does not count as visible at the station, this is already rated for in section A.</i></p>	<p>D</p> <p>Full price specification is available (app/ display) (Yes/No 0.5)</p> <p><i>The unit/units applied for cost calculation is leading – with a price per kWh it is expected that the number of kWhs is mentioned. If the session is charged based on time, you would expect to see the duration of the charging session.</i></p>	<p>F</p> <p>Full price specification is available (app/ display/email/ website/receipt) (Yes/No 0.5)</p> <p><i>The unit/units applied for cost calculation is leading – with a price per kWh it is expected that the number of kWhs is mentioned. If the session is charged based on time, you would expect to see the duration of the charging session.</i></p>	<p>H</p> <p>The amount equals the price advertised (Yes/No) (1)</p>	
			<p>I</p> <p>The price is specified by charging session and by price element (1)</p> <p>The price is specified by charging session (0.5)</p>	

If an ad-hoc charging session could be conducted, the price transparency of these charging sessions was scored in the same way.



4. Result

In this chapter, we present the results of the price transparency benchmark. Besides displaying by stage and by CPO-MSP, we also show data analyses by the categories: public/semi-public/rapid/ad-hoc and NACI regions.

4.1. Score per sector and per stage

The average score for price transparency of all charging sessions was 6.3/10. So, despite there being plenty of room for improvement, we could see that the scores in the pre-charging (A) (2.4/3) and invoicing stage (G, H&I) (2.4/3) were already relatively high. There was room for improvement with prices at charging stations (B, 0.1/1), the scores during charging (C&D, 0.3/1) and immediately after the charging session (E&F, 0.4/1). Below is an overview with the average scores per stage, compared to the maximum score per stage.

Score per sector and per stage										
	Total	Beforehand		During		Immediately after ⁵	Invoicing			Rating
Stage		A Price in app/ website	B Price at charging station	C Insight into kWh/time	D Insight into price	E & F Insight into price	G Invoice by time	H Correct price	I Specification charging session	J Number of Price elements
Test score	6.3	2.4	0.1	0.3	0.01	0.4	1	0.7	0.7	0.8
Max	10	3	1	0.5	0.5	1	1	1	1	1

Beforehand

In 81% of the charging sessions, the EV driver knew, in some way, what the price of the charging session was going to be. A distinction was made between whether the price (including VAT) for the charging station was specifically available in an app/website (72.5%), or with the same level of insight but then excluding VAT (only 1 case), or whether a generic charging price per CPO was available on an MSP's website (8.8%).

Furthermore, we tested whether the price was available at the charging station (12.6%). We find this low percentage reflected in the average score for component B (0.1/1). To score price transparency, more weight was deliberately given to part A. Price information upfront via an app or website scored a maximum of 3 points, compared to a maximum of 1 point if it was displayed at the charging station. If a price was displayed at the charging station, we also examined whether the different prices that MSPs may charge were mentioned. That was the case in 36% of the situations where a price was displayed at the charging station.

During

In 59% of the cases, information about the charging session was available during the session, such as the kWh charged or the duration. If information about the charging session was available, the price information was also provided in less than 1% of those cases. At rapid charging stations, the price was only disclosed during the charging session.

⁴ See paragraph 3.3 for the overview of how the score is constructed per charging session

⁵ The score of E&F is shown together because the factor for timeliness of information is applied over the sum of E&F (within 1 hour 100% score, within 24 hours 50% score)



Immediately after

In 87% of the cases, information about the number of kWh, time, or the price charged was available immediately after charging (up to 24 hours). The entire price structure was not available at any of the charging sessions; kWh and time were available. What struck us during testing was that there are significant differences in how information is provided by the MSPs. After the charging session, some MSPs send a text message with the information; others show it in an app. However, some MSPs offer no insight at all.

Invoicing

All MSPs sent the invoice within the legal deadline (two weeks after the end of the month) via post, email, or portal. In all cases, MSPs provided insight into the prices at session-level, with some MSPs specifying what the pricing elements were and others not. In 98% of the charging sessions, the pre-advertised price was the same as the price on the invoice. In the remaining 2%, the differences in the price were often minor, or a different pricing structure had been used. Whereas all MSPs display the price per charging session, this was not true for the price structure of a charging session. Only 1 out of 10 MSPs specified costs at session-level with all price components broken down.

If it was impossible to determine the price in advance or check the rate applied based on the information in the invoice, the score under section H (correct invoice) amounted to 0 points. As a result, the average score of 0.7/1 for this component went down, despite 98% accuracy in situations where the price was known upfront.

Price elements

Most charging sessions (54%) are charged on a kWh basis only. However, some other pricing models also came up during testing, with a combination including the additional pricing component "starting rate" being the most common. We only saw a combination of three or more different rates in 0.4% of the charging sessions. CPOs also offered some charging sessions for free (or for a certain length of time), although it varied from MSP to MSP whether the charging session was also in line with the zero-rate applied by the CPO.

4.2. Score per CPO-MSP combination

The table below shows the score per CPO-MSP combination. We also show the average and maximum score per organization. The average score is calculated as the average of a CPO or MSP's scores in combination with the other supply chain partners. It is not the average of all charging sessions where the respective party is involved. The maximum score is a theoretical maximum score, i.e., the maximum scores per stage added together. This maximum score provides insight into how a CPO or MSP is already capable of performing in an optimal situation.



CPO/MSP	Chargepoint.com	E-Flux	Ecotap	ElBizz	Eneco	Engie	Plugsurfing	Shell/TNM	VandeBron	Vattenfall	Average	Maximum
Allego	5,6	5,6	7,4	6,1	6,6	6,1	7,7	7,3	6,4	7,1	6,6	8,5
Engie	6,5	4,5	7,9	5,5	6,9	7,2	7,1	7,5	7,5	7,4	6,8	8,5
EV-Box	4,9	2,4	6,6	3,7	6,5	6,2	6,0	6,0	5,0	6,8	5,4	8,0
EVnet/ ParkNCharge	4,9	5,2	7,5	4,5	6,4	6,2	6,9	5,9	5,2	7,3	6,0	9,0
Fastned	6,7	7,3	8,3	7,8	8,0	8,1	9,0	8,5	9,0	8,5	8,1	9,5
Greenflux	3,9	4,5	6,5	4,3	7,0	6,0	7,3	5,0	3,8	7,0	5,5	8,0
Ionity	5,3	6,0	7,3	8,3	7,3	6,3	7,8	7,3	5,3	7,3	6,8	8,5
LastMileSolutions	5,0	3,9	6,9	3,5	6,5	5,7	6,5	6,1	6,0	7,0	5,7	8,5
NewMotion	5,7	5,1	6,4	5,1	6,7	6,1	6,9	6,4	5,0	7,1	6,0	8,0
Shell Recharge	6,8	7,3	7,8	6,5	7,8	7,8	7,8	7,5	5,2	7,8	7,2	9,0
Total/PitPoint	6,0	7,6	8,1	7,8	7,6	7,1	7,7	7,2	6,4	7,6	7,3	9,0
Vattenfall	3,3	6,8	7,1	6,9	7,3	6,4	7,4	5,4	4,5	7,5	6,3	8,0
CPO not clear	4,8	3,9	6,8	3,6	6,6	5,8	6,7	5,9	5,2	7,0	5,6	8,5
Average	5,4	5,5	7,3	5,8	7,0	6,6	7,3	6,7	5,8	7,3		
Maximum	9,5	9,5	9,5	9,0	9,5	9,5	9,0	9,0	9,0	9,0		

Interestingly, the maximum scores for both CPOs and MSPs are high, with a minimum of 8 for CPOs and 9 for MSPs, which indicates that the elements necessary to enable price transparency are in place with both parties. However, as the average score indicates, this potential in cooperation is not always achieved in practice. For example, MSPs score on average 2.8 points less than the maximum; for CPOs, this difference is slightly smaller: 2 points lower than the theoretical maximum.

The table above also shows the score for charging sessions where it was difficult to determine who the CPO was. We found it was often difficult to define whom the CPO was for charging stations that use white-label e-mobility platform providers (Last Mile Solutions or Greenflux) for the operation and information provision. Currently, in cooperation with their customers, the platforms are still unable to consistently state the correct CPO in apps, websites, at the charging station, and on the invoices.

The table below specifies the score per MSP for section A (Beforehand – price in website/app)

	Chargepoint.com	E-Flux	Ecotap	ElBizz	Eneco	Engie	Plugsurfing	Shell/TNM	VandeBron	Vattenfall
Score stage A	2.3	1.9	2.6	1.8	3.0	2.6	2.7	2.5	1.8	3.0

The results in section A clearly demonstrate that MSPs that offer fixed rates - rates independent of the CPO price - (Eneco, Vattenfall), score higher than others on this sub-section. However, it is not impossible to score well with rates that depend on the CPO price (Ecotap).

Finally, we note that if prices are not known in advance, this will automatically result in a lower score on the section invoicing.



4.3. NACI-regions

The charging sessions were conducted across the country. Therefore, we can now also gain insight into the status of the price transparency per NACI region in The Netherlands.

Table										
Region	Total score	Beforehand		During		Immediately after	Invoicing			Rates
		A Price in app/ website	B Price at charger	C Insight into kWh/ time	D Insight into price	E & F Insight into price	G Invoicing by time	H Correct price	I Specification charging sessions	J Number of price elements
Northwest	6.9	2.7	0.1	0.3	0.0	0.4	1.0	0.8	0.7	0.9
Southwest	4.7	1.7	0.0	0.2	0.0	0.4	1.0	0.4	0.6	0.4
North	5.9	2.3	0.0	0.1	0.0	0.4	1.0	0.7	0.7	0.8
East	6.1	2.3	0.0	0.3	0.0	0.4	1.0	0.6	0.7	0.8
South	6.2	2.4	0.0	0.3	0.0	0.4	1.0	0.6	0.7	0.7
G4	7.3	2.9	0.1	0.5	0.0	0.4	1.0	0.8	0.7	1.0
Highway	6.9	2.5	0.3	0.5	0.0	0.4	1.0	0.7	0.7	0.9
<i>Maximum</i>	<i>10</i>	<i>3</i>	<i>1</i>	<i>0.5</i>	<i>0.5</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>

The results show that most regions score between 6 and 7, with two exceptions. The G4 region⁶ stands out positively with a score of 7.3, while the regions Southwest and North show a lower score. The Zeeland and South Holland regions (Southwest) score notably lower in the stage “Beforehand” (A+B), and only achieves an average score of 1.7 out of 3. In contrast, the G4 region scores 2.9 out of 3, which automatically results in a lower score during the “Invoicing” stage (section H) because the price could not be checked.

33% of the charging stations on the highway display the price compared to 10% on average. The reason for this is that only rapid chargers were tested here, all of which display information

⁶ G4: the four biggest cities (gemeenten) in The Netherlands form the G4 – Amsterdam, The Hague, Rotterdam and Utrecht.



4.4. Ad-hoc charging

42% of the charging stations offered ad-hoc charging in some shape or form. The primary method was via a QR code that references a website or an app that enabled charging (62%). Other options included the smooov app, payment via credit/debit card or by calling a telephone number.

In 55% of the scheduled ad-hoc charging sessions, the price was available in advance via an app or website or on-site at the charging station. In 24% of cases where ad-hoc charging was possible, EV drivers needed to register additional data - other than the necessary payment details - before being able to charge.

If ad-hoc charging was not available at a charging station, we did not determine a score for transparency.

CPO	Ad-hoc option available	Average score ad-hoc charging sessions (0-10) <small>Only for charging sessions where it was offered</small>	Registration personal information
Allego	89%	6.4	no
Engie	0%	n.a.	n.a.
EV-Box	13%	3.5	no
EVnet/ParkNCharge	100%	3.9	no
Fastned	100%	9.5	no
Greenflux	50%	9.5	yes
Ionity	100%	6.1	yes
LastMileSolutions	6%	8.8	no
NewMotion	44%	5.8	yes
Shell Recharge	100%	6.0	yes
Total/PitPoint	67%	6.0	yes
Vattenfall	44%	6.0	no
CPO not clear	14%	6.0	Yes /No

The differences per CPO are significant: some CPOs hardly offer ad-hoc charging, while others, especially providers of DC rapid charging services (76%, average score 9.0), offer plenty of possibilities, with reasonably high price transparency). Nevertheless, their score is relatively low due to the lack of an invoice or receipt after the charging session.

Mainly semi-public charging stations have not yet adequately set up ad-hoc charging. 23% of the charging stations offered ad-hoc charging, with an average score of 4.9 for price transparency during the charging session.

The score on price transparency for the ad-hoc charging sessions is not included in the average score as mentioned in 4.1, so there is still a good distinction between ad-hoc charging and charging via a subscription.



4.5. Comparison public, semi-public and rapid chargers

In comparing public, semi-public, and rapid chargers, the public and rapid chargers scored better (6.5 and 6.8 respectively) than the semi-public chargers (5.8). 26% of the semi-public chargers did not provide prices in advance. This difference is primarily caused by the visibility of the price at the charging station (7% public, 32% rapid and 0% semi-public) and the insight offered into the charging details offered during the charging session. Rapid chargers score relatively high on this last point.

Type of charger	Average total score	Beforehand		During		Immediately after	Invoicing			Rates
		A Price in app/ website	B Price at charger	C Inzicht in kWh/ tijd	D Insight into price	E & F Insight into price	G Invoicing by time	H Correct price	I Specification Charging sessions	J Number of price elements
Public	6.5	2.5	0.1	0.3	0.0	0.4	1.0	0.7	0.7	0.8
Semi-public	5.8	2.3	0.0	0.2	0.0	0.4	1.0	0.6	0.7	0.7
Rap	6.8	2.4	0.3	0.5	0.0	0.4	1.0	0.7	0.7	0.8



5. Reaction stakeholders

Direct stakeholders received the draft report and were given the opportunity to comment on the study's findings in the report. The direct stakeholders are the CPOs and MSPs whose charging stations and/or charging cards were tested, and the NACI regions because, in many cases, they are the concession holder for the public charging stations in the study⁷.

The table below shows their responses.

	Name organisation	Type of organisation	Reactions to the study's results
1	EV-Box	CPO	<p>Together with NKL, EVBox has identified areas for improvement. We will further improve the price transparency for (semi-)public EVBox charging stations (for which we are CPO) by:</p> <ol style="list-style-type: none"> 1. Improving the location information of (semi-)public EVBox charging stations in cooperation with customers and partners. 2. Two of the 14 EVBox charging stations were listed as (semi-)public, even though those are private. 3. Increasing the visibility of the ad-hoc payment option together with partners and owners of (semi-)public EVBox charging stations. Currently, it is not always clear whether ad-hoc charging is possible at EVBox charging stations. This is one reason for the lower score. 4. Completing the migration of charging stations from BackOffice to Euron. This is time-consuming because old charging stations are being updated. 5. Continuing to develop the EVBox Charge app and our charging stations for more insight into costs during charging.
2	TotalEnergies	CPO	<p>At TotalEnergies, we recognize the need for price transparency for consumers. Regarding the study's findings on ad-hoc charging, we can comment that a rebranding and relabelling campaign was being realised at the time of the sampling. Meanwhile, the entire network has been relabelled and ad-hoc charging can take place at the charging stations included in the sampling. If desired, we can provide a more detailed explanation for this.</p>
3	GreenFlux	White-label e-mobility platform provider	<p>GreenFlux is a white-label e-mobility platform provider. We enable our customers to fulfil their role as CPO/MSP under their own name without developing the necessary software or establishing relationships with third parties (roaming CPOs, -MSPs, hubs). GreenFlux facilitates and is not acting as a CPO/MSP, has no contact with end users and does not interfere with the business operations of its customers.</p> <p>We are aware that charging station information that customers publicly share through our systems is sometimes incorrectly displayed by third parties. For example, because the name of the technical connection or roaming contract as CPO is incorrectly displayed. Because the information is freely available and anyone can display it, we have limited influence on this. We are continuously working with our customers to detect and correct such errors.</p>
4	Last Mile Solutions	White-label e-mobility platform provider	<p>As a white-label mobility platform provider, Last Mile Solutions (LMS) will under no circumstances act independently as CPO/MSP. As a platform provider, we enable our customers (CPOs/MSPs) to take on this role independently and under their own branding. We do not interfere with the business operations of our customers and are only active in the background.</p> <p>Moreover, there is some incorrect information in circulation in the market, whereby our customers are sometimes shown under the name LMS instead of the CPO/MSP's company name. We do not have much control over this information and its use by others is not our responsibility. We are continuously working together with our clients and partners to eliminate this incorrect information so that the end user has an accurate idea of the real CPO/MSP in question.</p>

⁷ A concession is an authorisation by the Dutch government that excludes others. The acquirer of the concession or concessionaire thus obtains a monopoly on, for example, a piece of land. The contracting authority of the government may also conclude a concession for the performance of public works.



6. Recommendations

The price transparency benchmark is the first benchmark for public and semi-public charging stations in the Netherlands. In this last chapter we give recommendations that should help any next benchmark provide additional results or be implemented more quickly or efficiently. These recommendations are not intended to increase price transparency.

6.1. *Process, scope, and focus*

- ***Resubmit research method to stakeholders***

The publication and discussion of the draft research method were central to achieving the necessary interaction between stakeholders. We used this interaction to refine the method and create support. Because the method could be further improved and a change in scope might occur, it is advisable to resubmit a new method to the stakeholders at an early stage.

- ***Continue to coordinate with service benchmark and possibly (in parts) integration***

The price transparency benchmark was conducted at the same time a service benchmark was being developed. There has been the necessary coordination between both projects. Suppose it is decided to conduct both a new price transparency benchmark and the first service benchmark. In that case, this could lead to advantages in efficiency and knowledge in combining or further aligning the design and/or implementation. Field testing is labour-intensive, and if different elements could be measured, that would lead to more efficiency. We could use the insight obtained from the service benchmark into the problems experienced by EV drivers to inform a new price transparency benchmark about the price elements to be examined or the rating of a price element in the score.

- ***Broadening the scope of research to include ad-hoc and semi-public***

The results showed that price transparency at ad-hoc and semi-public charging stations is not up to par. A new benchmark could further zoom in on this. For example, by including more semi-public charging stations or recording and categorizing the ad-hoc charging session in more detail.

- ***Regional differences***

The benchmark shows differences between the price transparency scores per NACI region. This benchmark already provides insight into the different stages in which the scores differ. A new study may provide further insight into the causes of the regional differences.



6.2. Method

- **Definition of invoice**

Whilst processing the data, per the chosen method, we found that not every party uses the same definition for an invoice. One question arose: Is an online overview of charging sessions that can be consulted (per month) the same as a similar overview in a PDF file sent to an email box? The method did not have a strict definition of the term "invoice" upfront. This can lead to ambiguity about the invoice criteria that are being tested. We decided to use the definition 'an overview (by letter, email or online portal) during the research, specifying the costs incurred. The amount paid can be checked without the invoiced party having to calculate this himself'. This means that invoices in a portal are included, while overviews in portals where the customer must set the period do not count as invoices. A predetermined definition of the term 'invoice' may prevent this ambiguity.

- **Rounding and margins**

Because the charging sessions were relatively short, we found that rounding differences can occur. As a result, the cost for a charging session as displayed immediately after the session may differ by a few cents from the same session on the final invoice. The method does not allow such margins to be defined, which could be predetermined during a subsequent benchmark. In this benchmark, we applied a margin of €0.02 so that rounding errors are not counted as incorrect prices.

- **Determining CPO**

Charging stations managed in white-label operating systems are often unable to unambiguously determine which party the CPO is, based on information retrieved from public websites, apps, on-site or the invoice. In a follow-up, an elaborate definition of CPO and a process for determining the CPO could provide the researchers with better tools for determining the CPO.

6.3. Execution

- **Unavailable infrastructure**

The list of 109 charging stations was compiled based on various rules and assumptions. The charging stations in question were not physically visited in advance to check the situation on the street. Sometimes, this meant that a charging station was not available or no longer available, it was behind a fence, or was inaccessible due to construction works. We could have eliminated some of these problems by checking the charging stations physically or via a mobile mapping service.

- **Ad-hoc charging method**

CPOs sometimes offer different methods for starting an ad-hoc charging session. Because applying a particular method can affect the price transparency score, it is advisable to determine how much freedom testers could have to go for the ad-hoc method and provide some hierarchy here.



Colophon

This price transparency benchmark was carried out by NKL on behalf of the steering committee of the Nationale Agenda Laadinfrastructuur (National Agenda for Charging Infrastructure - NACI) and in cooperation with Hogeschool van Amsterdam, LaadpasTop10.nl and MRA-Elektrisch.

Our special thanks goes out to our testers:

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Appendix I - Overview score per phase and MSP or CPO

MSP

MSP	Average total score	Beforehand		During		Immediately after	Invoicing			Rate
		A Price in app/ website	B Price at charger	C Inzicht in kWh/ tijd	D Insight into price	E & F Insight into price	G Invoicing by time	H Correct price	I Specification Charging sessions	J Number of price elements
Chargepoint.com	5,4	2,4	0,1	0,3	0	0,2	1	0	0,5	0,8
E-Flux	5,2	1,8	0,1	0,3	0	0,4	1	0,5	0,5	0,6
Ecotap	7,2	2,6	0,1	0,3	0	0,4	1	0,8	1	0,9
ElBizz	5,4	1,6	0,1	0,3	0	0,4	1	0,5	1	0,5
Eneco	6,9	3	0,1	0,3	0	0,5	1	0,8	0,5	0,8
Engie	6,4	2,6	0,1	0,3	0	0,2	1	0,8	0,5	0,9
Plugsurfing	7,1	2,6	0,1	0,3	0	0,4	1	0,9	1	0,9
Shell/TNM	6,6	2,5	0,1	0,4	0	0,5	1	0,8	0,5	0,8
VandeBron	5,6	1,9	0,1	0,3	0	0,4	1	0,7	0,5	0,7
Vattenfall	7,2	3	0,1	0,3	0	0,5	1	0,9	0,5	0,9

zCPO

CPO	Average total score	Beforehand		During		Immediately after	Invoicing			Rate
		A Price in app/ website	B Price at charger	C Inzicht in kWh/ tijd	D Insight into price	E & F Insight into price	G Invoicing by time	H Correct price	I Specification Charging sessions	J Number of price elements
Allego	6,6	2,6	0,1	0,2	0	0,4	1	0,8	0,6	0,9
Engie	6,8	2,6	0,1	0,3	0	0,5	1	0,7	0,7	0,9
EV-Box	5,6	2,1	0	0,2	0	0,4	1	0,5	0,6	0,7
EVnet/ ParkNCharge	5,9	2,4	0,1	0,2	0	0,4	1	0,6	0,6	0,7
Fastned	8	2,8	0,9	0,5	0,1	0,4	1	0,7	0,6	0,9
Ionity	6,8	2,2	0,2	0,5	0	0,2	1	0,9	0,6	1
NewMotion	6,1	2,5	0	0,2	0	0,3	1	0,7	0,6	0,8
Shell Recharge	7,2	2,7	0,2	0,5	0	0,3	1	0,8	0,6	0,9
Vattenfall	7,2	3	0,1	0,3	0	0,5	1	0,9	0,5	0,9
CPO not clear	5,6	2,1	0	0,3	0	0,4	1	0,5	0,6	0,6

An overview of the individual score per charging session can be requested via info@nknederland.nl.

