



Guidelines for the realisation of charging plazas

The number of electric vehicles is growing, and with it the demand for charging. As a result, in addition to regular charging stations, charging plazas are starting to become more prevalent. The charging plaza is an innovative charging solution that is still rapidly evolving, and for which many technological developments are expected. There are two different technical versions of charging plaza, and the choice of version depends on the situation.

What are these guidelines for the realisation of charging plazas?

This document comprises a set of practical guidelines for municipalities and market parties, offering an overview of the process of realising a charging plaza. They are based on the practical experience of municipalities and market parties.

The guidelines provide insight into the factors for consideration, choices and necessary agreements (requirements and options) in the process of realising a charging plaza for electric cars in public space. The agreements are explicit, correspond to international standards, and are largely supplementary to existing laws and regulations.

The guidelines serve as:

- a guide to the construction of charging plazas;
- a starting point for entering into agreements and signing contracts;

- inspiration for the development of policy on charging plazas;
- a point of departure for future public tenders and permits.

For whom are these guidelines intended

Principally for municipal governments. In addition, the requirements may be applicable to private charging plazas.

Reader's guide

These guidelines take the reader through the process of realising a charging plaza. Section 1 explains the most important definitions relating to charging plazas. Section 2 sets out the steps involved in the realisation process. Sections 3, 4 and 5 provide a detailed guide to the initial steps concerning the decision to realise a charging plaza and the determination of the necessary agreements. Section 6 discusses the subsequent steps, and section 7 explains how the guidelines have been established. The standard requirements and options for the realisation of a charging plaza are detailed in the NKL Uniform Standards for Charging Plazas, which is available online via www.nklnederland.com.





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Charging plazas

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Definition of charging plazas

For the sake of clarity, in these guidelines, a charging plaza is defined as follows:

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A charging plaza comprises more than two charging stations for electric vehicles which are not connected to the grid separately and share a single connection.

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A charging plaza is not a cluster of standard charging stations

According to this definition, a charging plaza is therefore not a concentration of individual charging stations, as these share the same power supply. For the construction of charging stations, also in concentration, please see NKL Uniform Standards for Charging.¹

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Other definitions

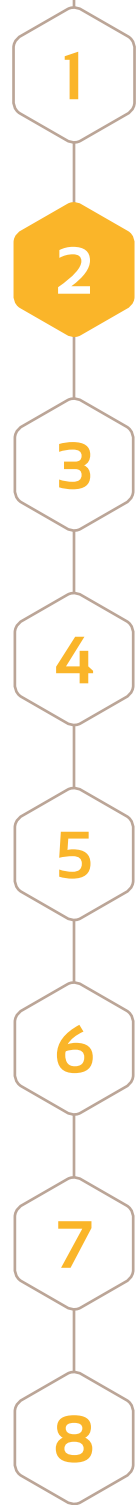
- *Charging point:* The electric power is delivered through a charging point. A charging point may have one or several connectors in order to accommodate different connector types. Only one can be used at the same time. However, only one vehicle can be charged at a time.
- *Charging station:* A charging station is a physical object with one or more charging points. It also has an interface which may comprise a status LED or display, keypad and a payment card/RFID reader
- *Charging infrastructure:* The total infrastructure associated with the charging station(s), including the main connection, charging station, charging point and cables.

A full list of definitions from RVO² is available, covering all terminology regarding electric vehicle charging.

¹ [NKL Uniform Standards for Charging Stations](#)

² [Electric vehicle charging - Definitions and explanation](#)





Steps in the process of realising charging plazas

From application to construction and management

The construction of a charging plaza comprises a number of steps (see figure 1). This process begins with the initiative to install a charging plaza, after which assessments and decisions on the type of charging plaza are made. These assessments and decisions result in a package of standard requirements and options for the procurement process. The procurement is followed by an approval process and contracting, and the charging plaza can then be constructed and operated.



Figure 1 - Schematic representation of the necessary steps for the construction of a charging plaza



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Steps in the process of realising charging plazas - continuation -

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Step 1: Initiative or application

Various parties, including both municipal governments and market parties, may take the initiative for the construction of a charging plaza. The municipal government will often choose to do so in order to meet the growing demand for charging on the part of residents and visitors. A market party will probably take the initiative because there is a viable business case to be made.

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Step 2: Assessment of the case for a charging station

After the initiative has been taken by a market party or municipal government, it is assessed whether a charging plaza is the right solution to fulfil the charging demand. The assessment takes into consideration a number of factors: spatial planning, streamlining traffic flow, scalability, service to users and reliability of charging point availability, stimulating the use of electric vehicles, financial considerations, combination with a mobility hub, and charging process management.

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Step 3: Choice of technical version

If it is decided that a charging plaza is indeed the desired solution, a technical version can be chosen: a master-slave structure or a system street unit. Both versions can be integrated into the street in different ways.

Step 4: Determination of standard requirements and options

In step 4, the municipal government establishes the options and standard requirements. These may be included in a Schedule of Requirements, for example, which can be used in a procurement process or to establish the terms within which a market party can construct a charging plaza.

Steps 5 to 9: Subsequent steps

The options and standard requirements then form the basis for a procurement process, for example in the form of a request for tender. The municipality can then initiate the approval process, including the necessary traffic order (verkeersbesluit). Once the permits have been granted, the market party can be contracted. Finally the market party can commence construction and the charging plaza can be put into operation.

NB: The steps above are a schematic representation, and the process may be different in practice. The approval and permits may already have been granted, or a market party may already have been contracted, for example by means of a concession. In this case, these steps are not applicable.



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Assessment of the case for a charging plaza

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A number of factors play a role in making the choice between a charging plaza and a charging station:

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- Spatial planning
- Streamlining traffic flows
- Scalability
- Service to users and reliability of charging point availability
- Stimulating the use of electric vehicles
- Financial considerations
- Combination with a mobility hub
- Charging process management.

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This section describes the factors taken into consideration in assessing the case for a charging plaza.

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process steps

ZIE H3 T/M H6

1

Initiative or application
By the municipality or the market

2

Assessment of the case for a charging station
Is a charging plaza the right solution?

3

Choice of technical version
Type of charging plaza

4

Determination of requirements and options
What requirements must be met?

5

Procurement in the market
Tendering

6

Approval process
Incl. traffic orders and neighbourhood participation

7

Contracting and licensing
Contracting the market party

8

Construction
Installation of infrastructure

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Operation & Management
Operation



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Assessment of the case for a charging plaza - continuation -

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Spatial planning

Possibility for concentration

A charging plaza can benefit the quality of public space. There might be a desire to make the public space more orderly and limit the distribution of objects in the street. A concentration of charging infrastructure (and necessary signage) is then a logical choice. Clustering public charging infrastructure also makes it possible to install signage and approve the necessary traffic orders more efficiently. As a result, it may be possible to speed up the construction process. To make the public space more orderly, it is also possible to integrate charging infrastructure into other objects, such as street lights (the charging point is then integrated into the lamp post). In this case, the street light must also be suitable for charging electric vehicles: a charging street light has a grid connection both for public lighting and for charging infrastructure.

Less space occupied

An advantage of a charging plaza is that the grid connection and control systems can be housed in a distribution box rather than in each separate charging station (see section 5). The charging station can therefore be smaller and narrower and thus more easily integrated into public space. This solution also makes it possible to integrate the charging station into other objects or street furniture in public space, such as lamp posts. For more examples, see www.andersladen.nl (in Dutch).

Streamlining traffic flows

The concentration of charging infrastructure can also be used to streamline the flow of traffic to the charging infrastructure; a charging plaza generates a flow of traffic to one place rather than traffic circulating in search of different charging locations. A well-situated charging plaza can therefore have a positive effect on city logistics.

Scalability

The work necessary to provide a grid connection for a charging plaza is the same as that for a charging station. It is therefore relatively easy to expand a charging station to create a charging plaza. It is also simple to add additional charging points to a charging plaza. However, this must be taken into consideration during the construction of the charging plaza, by installing the necessary cables, pipes and conduits. Where an existing charging station is expanded to create a charging plaza, a cable must be laid from the charging station with the grid connection (master) to the new charging station or stations (slave). In this case, a so-called master-slave structure (see H4) is the most obvious technical solution to scale up a charging station into a charging plaza. Scalability is clearly only possible where sufficient space is available.



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Assessment of the case for a charging plaza - continuation -

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Service to users and reliability of charging point availability

A charging plaza can facilitate a large number of users at the same time at a single location. EV drivers therefore have a greater chance of finding a free charging point than they do at a single charging station. This reliability of charging point availability is a great advantage to individual EV owners. Uncertainty about the possibility to charge a vehicle is currently one of the factors that deters motorists from purchasing an electric vehicle. In addition, a charging plaza is useful for groups of EV drivers, for example with the advent of electric taxis, delivery services or other EV fleets.

At a charging plaza, it is possible to offer charging at different speeds (AC/DC), thus meeting different charging needs.

It is important to provide EV drivers with adequate information on the charging plaza. This is possible by making it clear what the available capacity is per connected vehicle at the charging plaza in relation to the car or type of car. Smart charging concepts facilitate the optimal distribution of capacity per connected vehicle at the charging plaza, whereby a minimum capacity must be guaranteed. It is important that this takes into account the charge profile of the car.

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Stimulating the use of electric vehicles

A charging plaza increases the visibility of charging infrastructure in public space. This can stimulate motorists to switch to an electric vehicle.

Financial considerations

The business case for a charging plaza is potentially more favourable than for a charging station.³ This is partly in relation to the effort needed to provide the necessary infrastructure, and also because the capacity charge only has to be paid for a single grid connection. Because a charging plaza has more than one charging point, more than one EV can be charged at the same time. It is expected that this will increase the number of transactions, which also benefits the business case.

Combination with a mobility hub

A charging plaza can be combined with a mobility hub, with shared cars and bikes available, and the possibility to transfer to other means of transport.

³ This is not yet the case because at present the grid operator's costs are still higher for a charging plaza than for a charging station (both annual and once-only costs).



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Assessment of the case for a charging plaza - continuation -

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Charging process management

The different elements within the charging plaza are connected. The connection (grid operator) and/or the site owner can therefore optimally cater for the EV driver's charging requirements.

This also means that the power can be more efficiently distributed between the charging stations, making it possible to manage the power supply effectively and reduce the peak load on the grid.

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These factors determine the choice of technical version. Read more in section 5.

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Charging station or charging plaza?

This section describes factors which determine that the construction of a charging plaza is a good solution. In the case of the factors below, the construction of individual charging stations is possibly a more suitable option.

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Walking distance

Many public charging points are installed on request, so the municipal government and Charging Point Operator (CPO) will primarily look for a suitable location near the address from which the request is made. In theory this leads to greater decentralization and locations close to the EV driver. Municipalities which as yet do not have a dense network of public charging infrastructure need to take the walking distance to the charging station into consideration.

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To ensure that this distance is not too great, it is advisable to consider the position of charging plazas in the total strategy for rolling out public charging infrastructure in order to realise a full-coverage network.

Charging speed

With charging infrastructure that can supply a capacity of 3x25A, there is a risk that a charging plaza will be able to supply less capacity, for example if four EVs are charged at the same time. As a result, expectations on the part of the EV driver may be too high, leading to frustrations about charging speed and the length of the charging session. It is therefore important to discuss with construction partners the capacity at which it will be possible to charge vehicles at the charging plaza.



Figure 2 – EV charging street light in The Hague



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Different technical versions

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The factors above determine the choice of technical version for the charging plaza.

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Technical solutions for charging plazas

A charging plaza can be structured technically in a 'master-slave' structure or a 'system street unit' structure. The two version must be connected to a back office management system (if the charging plaza is accessible to the public).

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1. *Master-slave*: One charging station (the master) has a grid connection and is directly connected to the back office system. All the other charging stations (slaves) are connected to the master. The master determines the charging speed and communicates with the back office.
2. *System street unit*: A main connection to which other charging stations are connected. A system street unit can be connected both to DC (direct current – fast charging) and AC (alternating current – standard charging).

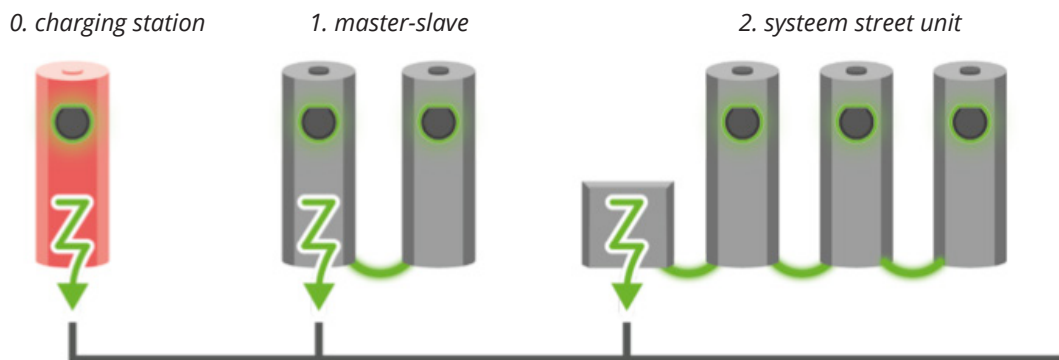


Figure 3 – Schematic representation of 0. standard charging station and the two different technical versions of charging plazas: 1. master-slave structure and 2. system street unit.



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Different technical versions

- continuation -

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The choice of technical version depends on various factors, one of the most important being the available space. A system street unit structure is often used for location in which plenty of space is available, such as in a large car park. If less space is available, the more obvious solution is a master-slave structure, whereby several charging are able to communicate with each other.

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Sometimes it is possible to integrate charging points into street furniture, such as lamp posts. This is only possible if the object in which the charging point is integrated is easily accessible to EV drivers and meets the necessary requirements. This is possible either in a master-slave or system street unit structure.

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Figure 4 – System street unit structure in Arnhem



Figure 5 – Master-slave structure in Breda



Figure 6 – Alderman in The Hague Liesbeth van Tongeren at a loading area integrated in the street furniture in The Hague.
- Photo: Inge van Mill -



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Choice of technical version

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A municipal government makes a choice of technical version based on the factors described in section 3. The table below indicates the extent to which a technical version is an appropriate choice in relation to one of the factors.

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NB. Charging plazas are always custom made depending on the situation. This table shows possibilities, but the situation may be different in practice.

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	Master-slave	System street unit	Standard charging station
Spatial planning	Concentration of charging infrastructure possible. Possible integration with other street furniture.	Possibility to concentrate a large number of charging points. Possible integration with other street furniture.	Risk of scattering charging solutions in public space .
Streamlining traffic flows	By concentrating charging points it is possible to streamline traffic.	By concentrating charging points it is possible to streamline traffic and to provide charging to a large number of users.	Risk of scattering charging solutions in public space resulting in increased traffic circulating in search of charging stations .
Scalability	Expansion possible depending on parking space and increase of grid connection to 3x80A (small-scale consumption).	Expansion possible depending on parking space. Maximum grid connection 3x250A (large-scale consumption).	Possible to expand by adding charging stations.
Service to users and reliability of charging point availability	Multiple charging points available. High reliability of charging point availability.	Multiple charging points available. High reliability of charging point availability. Possibility to offer standard and fast charging.	Low reliability of charging point availability at location.
Stimulating the use of electric vehicles	Visible	Highly visible	Low visibility
Financial considerations	Economical to construct: multiple stations installed at once.	Possibly expensive due to scale, but many transactions likely	Less economical to construct than charging plaza: comparable labour is needed for a single charging station.
Mobility hub	Can serve multiple vehicles.	Serves multiple vehicles and can offer charging via AC and DC.	Space for a limited number of vehicles.
Charging process management	Power distribution management possible.	Power distribution management possible.	Power distribution management possible.

Table 1 - Assessment of charging plaza form and relevant factors



1

Determining the standard requirements and option package

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There are a number of standard requirements which every charging plaza must meet. The standard requirements may be supplemented by options, and these may differ depending on the municipality or situation. They have been established on the basis of best practices and relate to aspects such as external characteristics or the surrounding area and location. The standard requirements and options for the realisation of a charging plaza are detailed in the NKL Uniform Standards for Charging plazas, which is available online via www.nklnederland.com.

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The standard requirements are discussed for each category:

- **Functionality:** including control system and interface
- **Design:** including appearance, materials and dimensions

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- **Engineering and safety:** including grounding and earth-leakage circuit breaker
- **Smart charging:** including protocols and load balancing
- **Environment and location:** including signage and free passage space
- **Back office and interface:** including data and price
- **Security:** including data and connection security
- **Standards and requirements:** including protocols and standardization
- **Management and monitoring:** including repair service, cleaning, maintenance and uptime
- **Application and construction:** including application portal and construction work



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Subsequent steps

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Once steps 1 to 4 have been completed, the subsequent phase can begin.

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Step 5: Procurement in the market

On the basis of the standard requirements and option package, a procurement process can be initiated, for example in the form of a Schedule of Requirements. It is important that the procurement process complies both with the applicable regulations and laws relating to procurement and locally applicable purchasing policy. Standard requirements and options can also be used to set requirements for a market party within a licensing model.

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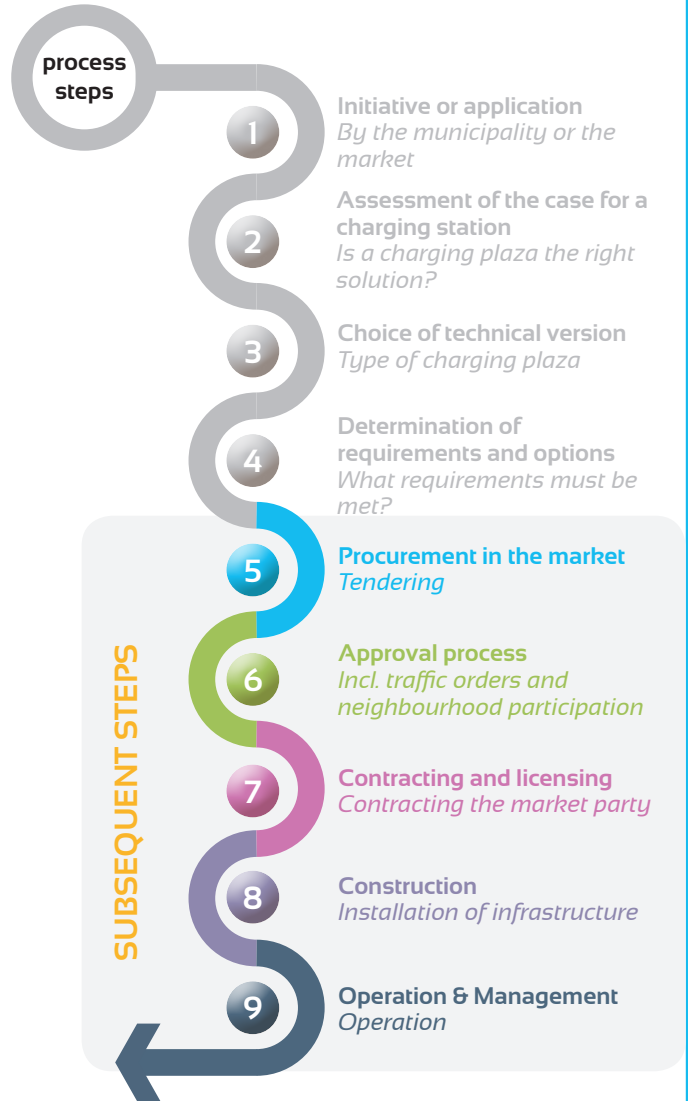
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Factors for consideration in drafting a procurement document

A charging plaza is always custom made according to the situation. The spatial characteristics of the location affect the possible choice of solutions and the appearance of the charging hub, which is not the case for charging station. It is important that the solution applied is reliable and future-proof. The technical version is not necessarily the most important factor. It is possible to call for information from the market and set technical requirements for the charging plaza, or requirements regarding aspects such as the desired uptime percentage. Based on the solutions generated by the market, the choice of technical version can then be made.



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Subsequent steps

- continuation -

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Step 6: Approval process

If necessary, the municipal government may initiate the approval process with a traffic order in order to reserve the parking spaces for EV vehicle charging. The municipal government may also choose first to discuss the location with local residents. If this option is chosen, it is recommended that it should take place earlier in the process, for example between steps 1 and 2. In this way the approval process can take place earlier and there will be less chance of objections being raised.

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Step 7: Contracting and licensing

If a suitable offer is made by a market party, the process of contracting and licensing for the construction, exploitation and management of the charging plaza may begin. A municipality may have an existing contract, for example with a concession holder that is able to install charging plazas according to the standard requirements and options set. This step may then be omitted.

Step 8: Construction

In consultation with the contractor, the charging plaza may then be constructed according to the requirements, taking into consideration the planning and lead time. For this step it is necessary to liaise with the grid operator.

Step 9: Operation & Management

The charging plaza is ready for use. At this point the operation phase begins and responsibility may be transferred to the contract manager.

NB. In these guidelines it is assumed that local purchasing policy is adhered to in the above steps. The municipal government itself will determine whether multiple tenders will be requested.



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Establishment of the guidelines for the construction of charging plazas

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The guidelines for the construction of charging plazas have been produced by the Netherlands Knowledge Platform for Public Charging Infrastructure (NKL). Within the scope of this independent foundation, a wide group of public and private stakeholders collaborate on the realisation of affordable and future-proof public charging infrastructure. The guidelines have been established thanks to input from a variety of parties concerned. To grid operators, safety and impact on the grid are of crucial importance; local authorities also consider the user options for EV drivers and environmental planning; and operators, manufacturers and other market parties are concerned about efficient implementation and management. The overarching interest of all parties is that charging plazas should be safe and functional, while keeping the costs as low as possible and providing the best possible service to the EV driver. From these different perspectives, the guidelines provide a clear overview of all the agreements relating to charging stations.

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Updating the guidelines

The guidelines are a living document. In the world of electrical transport and charging

infrastructure, there are constantly new technological advances and other developments. In order to continue to provide a relevant overview, it is important to keep track of these changes. Annual consultations are therefore held with a representative group of market parties and other stakeholders. This group then evaluates and revises the guidelines. There may be input from other NKL projects, new tenders, and developments originating from the market.

Organizations concerned

- Alfen
- Allego
- APPM
- CROW
- Ecotap
- Engie
- ElaadNL
- EV Consult
- Municipality of Amstelveen
- Municipality of Arnhem
- Municipality of The Hague
- Municipality of Rotterdam
- Municipality of Utrecht
- Amsterdam University of Applied Sciences
- NKL
- Over Morgen
- PARKnCHARGE
- Renault
- Stedin
- Dutch Organisation for Electric Transport (DOET)

