

Smart charging for all 2022-2025

Action plan

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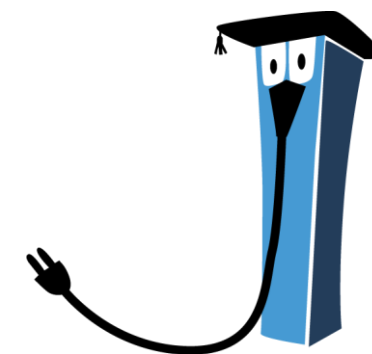
Foreword

Smart charging is *hip*: it is innovative, the technological developments are moving fast and it offers appealing prospects. In the National Charging Infrastructure Agenda, smart charging has acquired a seemingly self-evident position. And rightly so: I share the conviction of the experts who argue that smart charging is indispensable when it comes to integrating electric transport in a futureproof energy system. Smart charging also means that EV drivers can charge their vehicles more cheaply and more sustainably. All in all, smart charging is a *conditio sine qua non*.

Nevertheless, this self-evidence is not reflected in the process. A number of successful local projects and living labs have been implemented, but the large-scale national rollout of the network has been delayed. My wish is to accelerate that process. The recent reports of pressure on the electricity grid merely serve to enhance that urgency.

It is my intention that smart charging will become an everyday activity, for everyone. We have recently seen a whole raft of excellent ideas emerge, and the time is right to put those ideas into action. With a solid goal, a clear course and nationwide control. It is not without obligation and calls for an active contribution from all stakeholders. Against that background, I am delighted to invite you all to take up this action plan and to work together to ensure that as well as being hip, smart charging will also be happening.

Gerben-Jan Gerbrandy,
chairman NAL



Summary

Smart charging will enable demand-based management and temporary storage, via millions of electric vehicles. It will make the energy system more flexible, and as such is indispensable for the transitions in mobility and energy in the Netherlands. It will deliver huge advantages for society, EV drivers and providers of charging services. The National Charging Infrastructure Agenda (NAL) sees smart charging as a must have. However, the scaling up of the application of smart charging is taking place more slowly than socially desirable. Against that background, the NAL has elaborated a national programme entitled Smart charging for all 2022-2025 (SLVI2025) with the aim of accelerating the scaling-up process, in collaboration with all stakeholders from the charging chain. This action plan describes the hows, whys and wherefores of this programme.

Although there are plenty of technical solutions available for smart charging, with a proven track record, the extensive scaling up of the market for smart charging is taking its time. Estimates suggest that the proportion of smart charging sessions at the moment represents less than 5% of the total. At the same time, the calls from society for smart charging are becoming increasingly urgent. The integration of electric transport in the energy system is under pressure, with risks of local power disruptions. The challenge lies in urgently getting the market for smart charging moving, with the overall objective that by 2025, smart charging will be the standard for destination charging in the Netherlands.

The ambition of the NAL is that by 2025, more than 60% of all charging sessions are smart. To achieve that goal, SLVI2025 is working to realise an attractive offering for users, the national rollout of grid-conscious charging and boosting enthusiasm among

users to adopt smart charging. The approach is focused on aspects that will prove effective, in the short term. In the elaboration and implementation stages, SLVI2025 prefers to keep things simple, and will focus on what is achievable.

By 2025, there will be 578,000 EV drivers, of whom 270,000 will make the switch over the next few years. Costs and climate are the primary motives for switching to smart charging. The willingness appears to be high, but the charging offering must provide sufficient ease and charging guarantee.

For that reason, smart charging should be the standard setting, with a simple opt-out possibility. In terms of pricing, the opt-out is expected to be comparable with current cost of charging, while smart charging with the standard setting will be significantly cheaper. By ensuring charging guarantee with a guaranteed volume of energy over a specified time frame, attractive propositions will be offered to users.

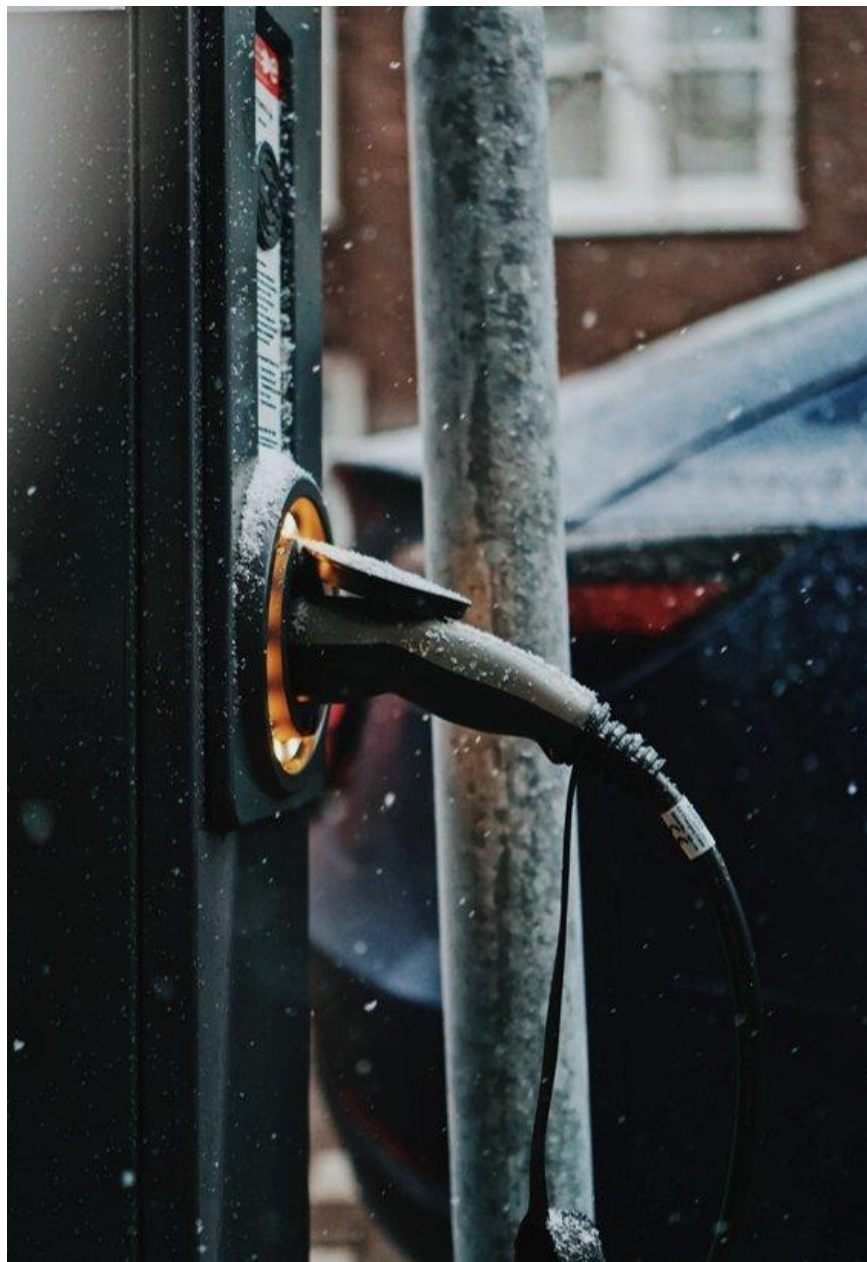
On the basis of a profile, providers will be able to optimise the use of the available grid capacity, while taking account of the limitations of the grid, wherever and whenever necessary. The pooling of charging points and the possibility of utilising the available capacity outside peak times will make smart charging even more attractive.

To boost enthusiasm among users for this offering, it is essential that a positive image is created in society based on sound information. It is important that users are approached during the purchase process via reliable channels and with productive communication frames.

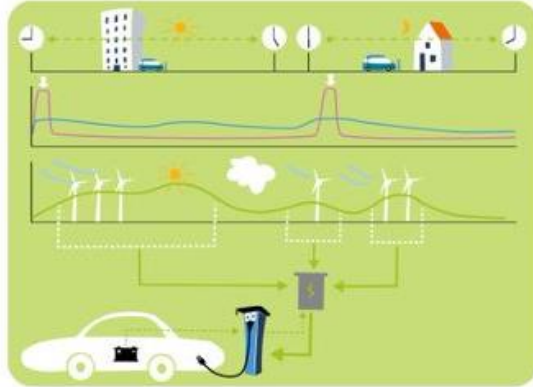
All these requirements have been translated into a programme of activities aimed at realising the overall ambition. In other words, safeguarding principles for an attractive and grid-conscious charging offering via requirements in concessions and permits, agreements with employers' organisations, the establishment of a leading

coalition of providers and the development of a label. It also requires encouraging the purchase of a smart charging infrastructure, the uniform nationwide rollout of grid-conscious charging and boosting enthusiasm among users through public information and support. Finally, the action plan aims to develop knowledge focused on the broad implementation of smart charging and the opinions and experiences of users.

The Ministries of Infrastructure and Water Management and Economic Affairs and Climate Policy (I&W and EZK) are the intended commissioning parties, whereby implementation of the action plan is an integral part of the National Charging Infrastructure Agenda (NAL). The task calls upon all the parties that make up the charging chain to take responsibility for the various actions in accordance with their role, based on a recognition of the need for cooperation. Implementation of the action plan will take place within a programme-based approach, with a view to safeguarding coherence and cooperation, with a moment for reflection and reassessment, each year.



Smart charging for all 2022-2025



What is smart charging

- Charging at smart moments
- Automatic, remote
- EV as temporary storage facility
- Optimum use of grid capacity
- Cheaper and more sustainable

Vision



- Smart charging as the standard
- Everyday routine
- Self-reinforcing market
- Flexible integration of EV
- Futureproof energy system

Ambition

60% of all charging sessions are smart

Smart charging available everywhere

Grid-conscious charging works

The Netherlands wants to charge smartly



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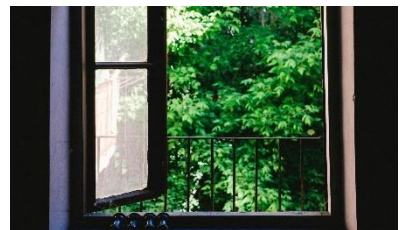
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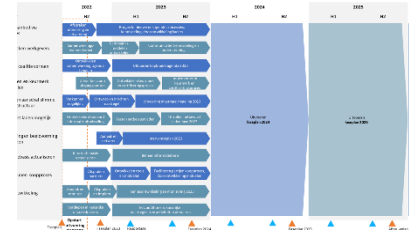
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Glossary

Provider

Market party able to offer smart charging services to users including (but not limited to) Charge Point Operators (CPO), e-Mobility Service Providers (eMSP), lease companies, energy suppliers, automotive manufacturers and Smart Charging providers.

AC charging sessions

The electricity grid supplies alternating current (AC) while the battery requires direct current (DC). An AC charging session is a charging session whereby electricity is transported through the charging cable via AC. The conversion from AC to DC takes place in the vehicle. Charging with alternating current generally means charging at limited capacity; referred to as regular charging. Fast charging (> 22 kW) is possible, but not as fast as with direct current (DC) charging because of the limitations of the transformer in the vehicle.

Destination charging

The charging of electric vehicles (EVs) at the final destination following a journey, for example at work or at home. In the case of destination charging, EVs are often connected to the charging point for far longer than strictly necessary to meet their charging needs. This creates space for smart charging.

More conscious charging

Smart charging focused on the optimisation objectives of the user related to the conscious wish to base charging on costs and/or climate.

Bi-directional charging

Charging with the possibility of both charging the battery of the EV and returning current to the grid (V2G) or to another energy consumer (V2X).

EV driver or User

Drivers of electric cars (current and future) able to purchase a (smart) charging service.

Domestic use rates

Rates for the domestic power connection. The domestic power connection for electricity offers a maximum of 3x80 Ampere. The vast majority are in the category 3x25 ampere (17.3 kW). This is often the energy connection to which the charging point is connected.

Charging offering

Commercial offering from a provider to a user for the purchase of one or more charging sessions. On the basis of the charging offering, the user determines the costs according to which the electric car is charged, at what capacity or speed, and subject to which conditions.

Charging guarantee

Aspect of the charging offering that ensures that users know what they can expect during a (smart) charging session, so that they can carry out smart charging with a sense of comfort, without the fear of being insufficiently charged, therefore encouraging them to more quickly adopt electric driving.



Local smart charging

Smart charging based on the limits of a (single) grid connection by means of a technique that adapts the charging speed to other energy consumption, from other charging vehicles and/or the business premises at the same connection (local and dynamic load balancing).

Grid-conscious charging

Aspect of smart charging whereby the charging process is automatically managed to permit charging within the limits of the capacity of the local medium-voltage and low-voltage transformer station. This offers opportunities for optimum utilisation of locally available grid capacity for all users of electricity in a neighbourhood, and to prevent overloading of the local grid by peaks in demand.

Commissioning party or Location owner

The location owner is the party who owns the location and as such is also often the commissioning party for the charging points. The commissioning party can for example be a municipality (public) or the owner of a park facility (semi-public), a company that installs a charging point on its own carpark (semi-public) or a homeowner (private).

Smart charging

Automated management of a charging session for one or more EVs (in combination) in time (charging moment), capacity (charging speed) and/or current direction (charging or discharging) with the aim of optimising supply of and demand for (renewable) energy and flexibility services, within the limits of the energy system (grid-conscious charging) and aimed at offering advantages for the user in terms of costs and/or climate (more conscious charging).

Smart charging services

Services from providers to users for charging an electric vehicle using smart charging, whereby the user is able to make choices in terms of cheaper, more sustainable and/or faster charging, etc.

Smart charging session

A charging session for an electric vehicle using smart charging based on standard settings (passive smart charging) or user preferences (active smart charging).

Smart Charging Requirements (SCR)

The SCR describe the technical parameters for enabling smart charging. These relate to the vehicle, the charging cable, the charging point and the electric installation, the measuring device and the grid connection. The aim is to provide a uniform definition for 'smart charging ready'. To safeguard the sustainable availability of the charging infrastructure in the Netherlands, electric cars and charging points must be 'Smart Charging Ready'. These requirements are included in the public tender for local governments.

State of Charge (SoC)

Charging status of the battery in an EV.

Vehicle-to-grid (V2G) and vehicle-to-everything (V2X) technology

V2G technology makes it possible to use the battery of an electric vehicle to provide (temporary) buffer capacity in the (local) network. This buffer capacity can on the one hand be used to return electricity to the grid at a later moment (V2G) or on the other hand to other energy consumers in the local network (V2X).

1 Introduction

Smart charging will enable demand-based management and temporary storage, via millions of electric vehicles. It will make the energy system more flexible, and as such is indispensable for the transitions in mobility and energy in the Netherlands. It will deliver huge advantages for society, EV drivers and providers of charging services. The National Charging Infrastructure Agenda (NAL) sees smart charging as a must have. However, the scaling up of the application of smart charging is taking place more slowly than socially desirable. Against that background, the NAL has elaborated a national programme with the aim of accelerating the scaling-up process, in collaboration with all stakeholders from the charging chain. This action plan describes the hows, whys and wherefores of this programme.

This introduction starts by outlining the context of smart charging. The term smart charging is then further explained, together with its benefits. The background to and purpose of this document are then discussed, and the chapter closes with a brief guide on reading the entire document.

1.1 Transition in mobility and energy

The Netherlands is quickly becoming more sustainable. We are on the eve of a revolution in mobility, whereby we will make the transition from filling a vehicle with fossil fuel to charging with renewable electricity. In this way, we will reduce the emissions from our means of transport, in line with the target from the coalition agreement (2021). At the same time, the energy system is changing.

¹ Refa, N., Hammer D., & Van Rookhuijzen, J. (2021). *Elektrisch rijden in stroomversnelling. Elektrificatie van personenauto's tot en met 2050. Outlook Q3 2021*. ElaadNL; RVO (2022). *Electric Vehicles Statistics in the Netherlands, up to and including April 2022*, [Frontpage \(rvo.nl\)](https://frontpage.rvo.nl)

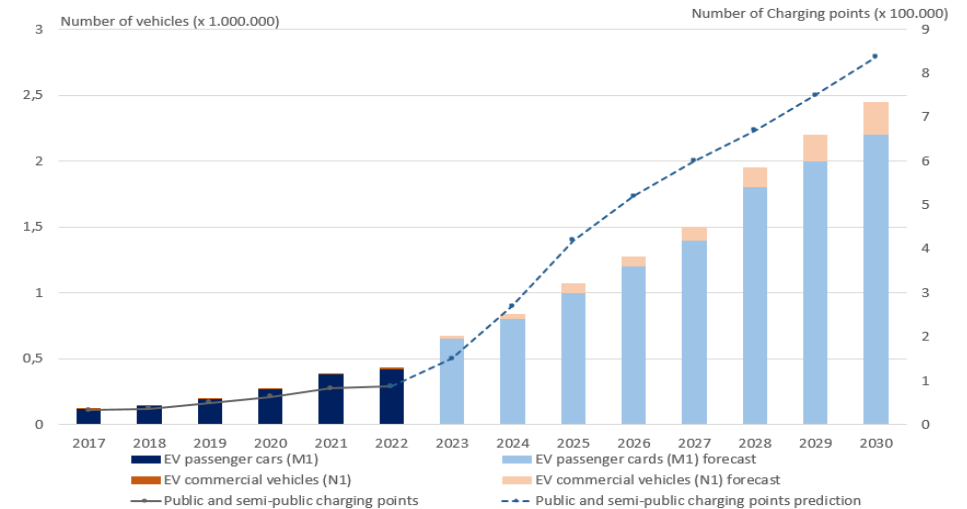


Figure 1: Forecast numbers of EVs and charging points

The demand for electricity will rise enormously, due to the growth in the number of electric passenger cars, that is due to exceed 2 million by 2030.¹

Demand is also rising as a consequence of the heat transition in the urban environment. For the production of electricity, we are making the switch to primarily solar and wind power generation. That itself demands a switch from centralised to decentralised production. The transition has been further boosted by the national desire to become less dependent on gas from Russia.²

The transitions in mobility and energy entail major challenges. Over the coming years, the production of electricity is set to become less manageable: the wind does not always blow at a constant speed and there are times and seasons in which the sun shines less. Moreover, as a result of growing electrification, there will be large and variable peaks in demand. As a consequence, the limits of the

² ANP (2022), [Jetten: Nederland moet eind 2022 van Russisch gas af | BNR Nieuwsradio](https://www.anp.nl/nieuws/nederland-moet-eind-2022-van-russisch-gas-af), viewed 22 April 2022

current electricity network could be reached, despite extensive investment plans, and that situation has indeed already arisen at various locations across the Netherlands³. To face up to these challenges, we must rapidly increase the flexibility of the energy system⁴. Smart charging is the ideal solution for bringing about the necessary flexibility in mobility.

1.2 Smart charging

During their charging sessions, electric vehicles (EVs) are often connected to the charging point for longer than is necessary to meet their charging needs. This applies in particular to destination charging: charging at the final destination of a journey, for example at home or at work. As a consequence, no charging actually takes place during the final hours of a charging session. That fact creates flexibility and freedom to organise a charging session more smartly.

Smart charging makes it technically possible to manage the demand for electricity, from EVs. As a consequence, during a charging session, the demand can be distributed in such a way that it generates social and/or commercial benefits. In addition, in the near future, the batteries of most EVs will be suitable for the temporary, flexible storage of electricity, that at a later moment they can feed back to other energy consumers⁵. All in a way that causes no disruption to the EV driver; indeed, in such a way that the EV driver experiences the benefits. We refer to this technological concept as *smart charging*, according to the following definition:

Smart charging is the automated management of a charging session for one or more EVs (in combination) in time (charging moment), capacity (charging speed) and/or current direction (charging or discharging) with the aim of optimising supply of and demand for (renewable) energy and flexibility services, within the limits of the energy system and aimed at providing benefits for the user in terms of costs and/or climate.

The available applications for smart charging can be classified according to three levels of increasing complexity, possibilities and benefits. These are reproduced in Table 1.

Table 1: Levels of application of smart charging

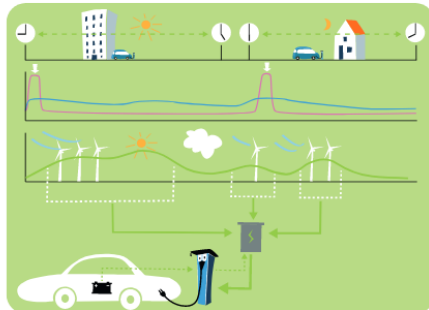
Level	Application	Explanation
1	Local	smart charging focused on the limits of grid connection
2	Remote management	smart charging focused on the remote management of charging sessions on demand
3	Bidirectional	smart charging aimed at the remote management of charging sessions on demand, and the use of the battery of the EV as a temporary storage facility for returning power to the grid (V2G) or other energy consumers (V2X) at a later moment.

Providers can develop a range of propositions for smart charging services based on these applications. The economic value of smart charging can therefore be valorised, via the markets for energy and flexibility.

³ NOS (2022), [Netbeheerders willen dat overheid aan 'energieplanologie' gaat doen | NOS](#), viewed 13 June 2022

⁴ Netbeheer Nederland 2021. *Het Energiesysteem van de Toekomst. Integrale Infrastructuurverkenning 2030 -2050*.

⁵ Vehicle-to-grid (V2G) and/or Vehicle-to-everything (V2X)-technology



What is smart charging

- Charging at smart moments
- Automatic, remote
- EV as temporary storage facility
- Optimum use of grid capacity
- Cheaper and more sustainable

1.3 Indispensable for the growth of electric transport

The large-scale application of smart charging with remote management and/or bidirectional charging, levels 2 and 3 in Table 1, can make an indispensable contribution to:

- matching the supply of and demand for energy, for example by charging EVs, when surplus renewable energy is available;
- maintaining balance in the energy system;
- reducing congestion in the electricity grid by making optimum use of capacity and preventing huge peaks in demand⁶.

With smart charging, the EV will no longer be a limiting factor in the energy transition, but instead represents an important part of the solution. The large-scale use of smart charging will deliver significant benefits for society, EV drivers and market providers. These benefits are explained below.

Society

- Estimated 11% additional reduction in CO₂ emission in the transition to electric transport simply by shifting charging times

⁶ Rooijers, F., & Jongma, C. (2020). *Verkenning ontwikkeling CO₂-vrije flexibele energietechnieken*. CE Delft.; Netbeheer Nederland (2021). *Het Energiesysteem van de Toekomst. Integrale Infrastructuurverkenning 2030 -2050*; Van Cappellen, L., Jongma, & C., Rooijers, F. (2022). *Het net slimmer benut!* CE Delft.

to avoid peak loads⁷. Using smarter methods for optimisation and depending on the objective and the technology employed, this percentage could achieve an order of magnitude of 20%.

- Reduced risk of (local) overloading of the electricity grid thereby avoiding an estimated €1.4 billion in investments in the electricity grid set against an estimated one-off investment of €100 million (platform, hardware, IT) and annually recurring costs for management and maintenance of 5 million euro⁷.
- Contribution to the integration of electric transport by installing more charging points before a dependency is created requiring reinforcement of the electricity grid.
- Contribution to the integration of energy generation from solar and wind, in the energy system.
- Contribution to a greater economic earning potential for Dutch industry by reinforcing the international position of the Netherlands as a leader in the field of services, products and knowledge of smart charging.

Users

- Worry-free switch from fossil to electric driving.
- Benefit from the possibilities for cheaper and/or more sustainable charging.
- Benefit from a transparent and uniform charging offering.

⁷ Scholten, B., Idema, H.-J., Afman, M., & Scholten, T. (2018). *Slim laden must have bij groei elektrisch vervoer*. Enpuls.

Providers

- Increase earning potential due to accelerated valorisation of the commercial potential of flexibility in large numbers of EVs.
- The possibility for installing more charging points.

Without smart charging, the integration of electric transport in some parts of the electricity grid will become problematic, over the next few years, resulting in a risk of local power disruptions. In that sense, smart charging is indispensable for the growth of electric transport and a futureproof energy system.

1.4 Programme for acceleration

The National Charging Infrastructure Agenda (NAL) is a partnership between government, grid operators and market parties, and its mission is to ensure that the charging infrastructure is not an obstacle to the scaling up of electric transport. The NAL sees smart charging as a must have with a view to ensuring a stable and affordable electricity grid and the worry-free transition to electric transport.

The NAL has noted that the scaling up of smart charging is taking longer than socially desirable, and therefore wishes to accelerate the nation-wide scaling up of smart charging. To ensure the implementation of targeted actions, at the end of 2021, a start was made on establishing a national programme for the scaling up of smart charging: Smart charging for all 2022-2025 (SLVI2025). This action plan is the result of the establishment phase of SLVI2025 and describes the value and necessity of accelerating the scaling up of smart charging, precisely what the NAL intends to do to realise that ambition and how the programme can be managed in a structured manner.

1.5 Reading this document

Chapter 2 describes the current status of development of smart charging, the challenge the programme represents, and the target for 2025. In chapter 3, these aspects are translated into a practical ambition and the accompanying underlying tasks, with a strategy for the programme. Chapter 4 provides insights for making the translation on the one hand to a uniform framework for the charging offering, and on the other hand effective interventions for encouraging demand. Subsequently, chapter 5 provides explanatory notes to the activities (what) and chapter 6 deals with the governance aspect (how).



2 Vision

Although there are plenty of technical solutions available for smart charging, with a proven track record, the extensive scaling up of the market for smart charging is taking its time. The number of smart charging sessions is currently still relatively low. At the same time, the calls from society for smart charging are becoming increasingly urgent. The integration of electric transport in the energy system is under pressure, with risks of local power disruptions. The challenge lies in urgently getting the market for smart charging moving, with the overall objective that by 2025, smart charging will be the standard for destination charging in the Netherlands.

This chapter provides a picture of the current status of the market for smart charging. What follows is a description of the urgency and the challenge being faced in ensuring that the market can be scaled up, as well as the target situation that smart charging will hopefully bring about.

2.1 The current status of the market

Recent initiatives on the Dutch market in the field of smart charging have for the most part involved study and trial projects on a scale of less than 1,000 smart charging points, the purpose of which has been to demonstrate the technical (operational) feasibility of smart charging at a public or private charging point. A number of other initiatives are emerging, on a larger scale, with a commercial rollout intended for users⁸. Based on a common need for facilitating the scaling up of the market, with uniform, nation-wide market

standards, smart charging requirements⁹ (SCR) have been developed by the NAL. These SCRs list the requirements that the charging infrastructure must satisfy in terms of technology and data communication in order to facilitate smart charging. These requirements will be included in public tender procedures by local governments. At present, it is estimated that the proportion of smart charging sessions amounts to less than 5% of the total. Table 2 provides an overview of the current development status of the market for smart charging, for each technical application level.

⁸ Moorman, S., & Mergelsberg, S. (2021). *Lessons learned Smart Charging Nederland, 2015-2020*. NAL.

⁹ NAL core team Smart Charging (2021). *Smart Charging Requirements (SCR)*. NAL.

Table 2: Development status of the market for smart charging for each application level

Level	Application	Explanation
1	Local	The local sharing of the capacity available from a grid connection at charging points, charging hubs ¹⁰ , larger buildings and home charging points is already common practice, but this only makes use of a part of the potential of smart charging.
2	Remote management	The technical solutions for smart charging via remote management are widely available in the Netherlands and beyond, and have a proven track record. The technology for smart charging is constantly being further developed in various (trial) projects at specific locations. Nevertheless, the availability and scale of the application of smart charging via remote management is still limited.
3	Bidirectional	Bidirectional charging is both viable and proven as a technical solution, but a number of obstacles remain ¹¹ and the number of EV models suitable for this technology is still very limited.

These observations reveal that in technical terms, the next step in the scaling up of smart charging with remote management is achievable.

¹⁰ In 2019, 46 smart charging hubs were completed in 19 municipalities, in the framework of the Climate Envelope

¹¹ Tezel, G., Muller, N. (2021). *V2G – waarde en de weg voorwaarts*. Strategy&.

2.2 Getting the market moving

The need for a more flexible energy system is becoming ever more urgent. In the provinces of Limburg and North Brabant, a temporary halt was announced in June 2022 on connecting businesses and organisations to the electricity grid. The rapid development in the number of heat pumps, charging points, new businesses and measures aimed at making industrial enterprises more sustainable has led to an explosive growth in demand for capacity on the electricity grid. For these reasons, a temporary halt has been announced on businesses wishing to be connected or to upgrade their connection to the electricity grid, both for the purchase and generation of electricity. The Minister has made it clear that the lack of transport capacity as a consequence of the huge demand for electricity transport cannot be easily solved at short notice, despite the best efforts of the grid operators¹². The urgency was also reflected in recently published grid impact analyses¹³ according to which grid operators have published details of the impact of the growing demand on the electricity grid, for mobility purposes.

Despite the technical feasibility and urgency, the scaling up of the market for smart charging is progressing slowly. If this scaling up continues to lag behind, it will result in ever greater problems for the integration of electric transport in the electricity grid, with the risk of local power disruptions.

From a social point of view, it is not desirable to have to wait for the (time-consuming) current processes for changing law and regulations, that partly depend on developments in Europe. The challenge is to get the market for smart charging moving, within a timeframe of around three years, within the existing frameworks.

¹² NOS (2022), [Netbeheerders willen dat overheid aan 'energieplanologie' gaat doen | NOS](#), viewed 13 June 2022

¹³ Netbeheer Nederland (2022b). *Netimpact rapportage laadinfrastructuur*. Per NAL-regio. [Netimpactrapportages](#) • [Projecten](#) • [ElaadNL](#)

2.3 Smart charging as the standard

In our efforts to accelerate the scaling up of the market for smart charging, a target for smart charging has been set, for 2025. That vision is further elaborated on the next page, and is in line with the vision of the State Secretary for Infrastructure and Water Management¹⁴, recently shared with the Dutch House of Representatives.



¹⁴ Letter from the States Secretary for Infrastructure and Water Management dated 15 June 2022 IENW/BSK-2022/118650, [Regionale uitrol laadinfrastructuur | Tweede Kamer der Staten-Generaal](#)

By 2025, smart charging will be the standard for destination charging in the Netherlands.

There is an attractive and broad smart charging network available all across the Netherlands. Users have become accustomed to smart charging sessions as an integral part of their everyday routine. There is no cause for concern, they know what they can expect and can make other choices, should they need to do so. As a result, users and employers benefit from cheaper and more renewable energy. Car drivers can switch from fossil to electric power worry-free, and expect to be and indeed are secure in the knowledge that their vehicle will be charged smartly. The transition to the new rates for domestic electricity connections is advancing relatively smoothly: EV drivers are already used to avoiding peaks in their energy demand, via smart charging.

The market for smart charging has grown beyond the critical size, bringing about a self-affirming effect in an ever evolving market. No further efforts are required from a national programme. A number of market parties offer attractive propositions for smart charging, subject to acceptable operating risks and valid business cases.

The timely scaling up of smart charging has made an indispensable contribution to the successful integration of electric transport and the renewable production of energy in a stable, affordable and futureproof energy system. The capacity of the grid is used efficiently, hugely reducing the risk of overloading the network. On an international scale, Dutch companies are an inspiration for others in the development and application of new and smart charging techniques and solutions.



3 Targets and strategy

The ambition of the NAL is that by 2025, more than 60% of all charging sessions are smart. To achieve that goal, SLVI2025 is working to realise an attractive offering for users, the national rollout of grid-conscious charging and boosting enthusiasm among users to adopt smart charging. The approach is focused on aspects that will prove effective, in the short term such as safeguarding uniform frameworks for the charging offering via (public) commissioning parties and co-regulation with providers, encouraging the purchase of smart charging infrastructure and the use of social management and behaviour instruments. In the elaboration and implementation stages, SLVI2025 prefers to keep things simple, and will focus on what is achievable.

In this chapter, the vision of SLVI2025 is translated into a real ambition with a series of subtasks. The approach is based on an observation of opportunities and obstacles. Finally, the guiding principles set the course for the way in which elaboration and execution will be tackled.

3.1 Ambition

The target for smart charging in 2025 gives rise to the primary objective of SLVI2025, namely far more smart charging sessions in the Netherlands. The actual ambition is:

¹⁵ The focus is on vehicle categories M1 and N1, namely: passenger cars, taxis, target group transport and light commercial vehicles (light logistics). If possible, charging sessions with light EVs (such as s-scooters) are not taken into account.

By 2025, more than 60% of all charging sessions are smart.

This ambition refers to AC charging sessions at a charging location with a domestic use connection or a charging hub suitable for electric vehicles lighter than 3500 kg¹⁵, whereby the connection time of the vehicle and the charging point is four hours or longer. This relates to charging at public, semi-public and private locations whereby all types of application or proposition in respect of smart charging are possible. Any such charging session is ‘smart enough’ to be included in the target scope, if it satisfies the following characteristics:

- Charging is grid-conscious: within the limits of the locally available grid capacity;
- It offers the user sufficient ease of use, charging guarantee, transparency and influence;
- Smart charging is used to automatically optimise costs and/or climate;
- There is sufficient flexibility in the charging session.

These characteristics of a smart charging session are explained in more detail in sections 4.2 and 4.3.

By 2025, an estimated 51 million charging sessions¹⁶ will be included in the categories we have identified, whereby charging volume will amount to 3.56 GWh per year in total. If we achieve our target that would mean that in 2025, 30.6 million charging sessions are smart. That in turn would result in an additional CO2 reduction of at least 0.07 Mton per year¹⁷ and an avoided cumulative investment in the grid through to 2025 of at least 80.6 million euro. As electric

¹⁶ Based on Refa, N., Hammer D., & Van Rookhuijzen, J. (2021). Elektrisch rijden in stroomversnelling. Elektrificatie van personenauto's tot en met 2050. Outlook Q3 2021. ELaadNL, with the assumption that 60% of all charging sessions last longer than 4 hours.

¹⁷ Scholten, B., Idema, H.-J., Afman, M., & Scholten, T. (2018). *Slim laden must have bij groei elektrisch vervoer*. Enpuls.

transport and the electrification of other sectors continues to grow in the period beyond 2025, the related further scaling up of the market for smart charging will cause these benefits to rise, accordingly.

3.2 Sub tasks

Smart charging sessions are achieved in the situation when need and demand on the part of users and the charging offering on the part of providers match. In other words, in order to scale up the market, both the demand side and the supply side face a challenge. Grid-conscious charging, as part of the charging offering, demands additional attention because at present there is no natural market incentive for users or providers. Against that background, the challenge can be divided into three sub tasks, which together identify the area in which SLVI2025 wishes to work together with

the relevant parties from the charging chain, in the period through to 2025.

These tasks and the accompanying targets set the course and identify the relationship between the efforts we plan to undertake in order to realise the ambitions of SLVI2025. In Bijlage A we translate those targets into benefits and measurable indicators for monitoring, during the execution phase of the programme. In the next sections, we further elaborate the nature of the tasks.

3.3 Approach

The approach to these three sub tasks is based on the obstacles and opportunities that were identified when we considered a number of studies. The first of these is the study undertaken on behalf of the NAL into possibilities for the accelerated scaling up of smart charging via nationwide agreements on the

Table 3: Overview of sub tasks SLVI2025

	Desired situation	Task / subtask	Objective
	Smart charging is the standard in 2025	Accelerating the scaling up of the market for smart charging	More smart charging sessions
I	Smart charging is available everywhere	Realising an attractive, broad-based and large-scale offering of smart charging	More attractive, broader based and larger offering of smart charging
II	Grid-conscious charging works	Grid-conscious charging should be rolled out nationwide, according to a uniform approach	More grid-conscious charging sessions
III	The Netherlands wants smart charging	Users and employers are enthusiastic about smart charging	Greater willingness and demand for smart charging among users and employers

organisation of the charging chain and the charging offering¹⁸. That study provides clear starting points for the step towards a uniform framework for the charging offering and a uniform framework for grid-conscious charging. In addition, the results of studies by PwC, NKL Nederland and Enervalis¹⁹ were examined. The lessons from the report *Lessons learned smart charging in the Netherlands*²⁰ were also used.

A proportion of the solutions proposed in these studies cannot be realised in the short term, given the related lead times, for example because they require adjustments in (European) law or because of complexities brought about by diverging interests. There are a number of developments that are expected to result in an additional market stimulus for smart charging. These include the gradual phasing out of the balancing scheme starting in 2025, according to which the own use and storage of own generated renewable energy from solar sources will become increasingly attractive. Also relevant is the development of new rates for domestic use connections (in Dutch KVA, expected in 2025) that will deliver a financial stimulus for avoiding peak loads, through smart charging. However, these developments will only take effect in several years' time.

In the establishment phase of SLVI2025, insights and solutions that offer starting points for shorter-term effects were considered. Consultations with various groups of stakeholders, including the providers of smart charging²¹, contributed to the chosen approach as reproduced in Table 4 on the next page.



¹⁸ Ten Have, S., Hendriks, A., & Idema, H.-J. (2021). *Verkenning organisatie slim laden*. NAL.

¹⁹ PwC (2017). *Smart Charging van elektrische voertuigen. Institutionele knelpunten en mogelijke oplossingen.*; NKL Nederland en Enervalis (2021). *Smart charging synergies: Conflicten en belangen rondom proposities voor slim laden - een verkenning*. TKI Urban Energy, Topsector Energie.

²⁰ Moorman, S., & Mergelsberg, S. (2021). *Lessons learned Smart Charging Nederland, 2015-2020*. NAL.

²¹ APPM (2022), *Verslag Marktconsultatie, Slim laden voor iedereen*. NAL.

Table 4: From obstacle and opportunities to the approach

Task	Obstacle or opportunity	Approach
I	<p>Users' interests - Users' representatives perceive a lack of clarity regarding the frameworks to be imposed by governments and grid operators on smart charging, and have concerns about safeguarding the interests of the user.</p> <p>Uncertainty among providers - Providers perceive the same lack of clarity. The business case for smart charging is currently not yet valid, but providers do recognise the potential of smart charging. Whereas in the past the business case was viewed as an obstacle to the development of propositions²², the obstacles now above all lie in the uncertainties resulting from the lack of clarity²³.</p> <p>Commissioning parties - Public commissioning parties and employers' organisations are positive about the co-regulation of smart charging on the basis of a uniform framework.</p> <p>Smart charging point at home - Just 41% of the charging infrastructure at home at present has (any) smart charging function. 60% of location owners are required to pay for the charging infrastructure themselves. The costs of purchasing a new smart charging point for home use can easily amount to at least €2000, including excavation work²⁴. For many private individuals, this amount is a considerable stumbling block²⁵.</p>	<p>Safeguarding a uniform smart charging offering - Developing the principles for a uniform (smart) charging offering that takes account of the interests of users. Focusing on safeguarding via (public) commissioning parties and co-regulation with providers.</p> <p>Encouraging the purchase of charging points - Investigating how the financial obstacle to the purchase of smart charging infrastructure can be reduced, provided that charging is carried out smartly.</p>
II	<p>Clarity on grid-conscious - Stakeholders recognise the value and necessity of grid-conscious charging. They also recognise the opportunities for making optimum use of the grid capacity. What is currently still lacking is a nationwide framework for grid-conscious charging and the necessary information about the available grid capacity.</p>	<p>Uniform grid-conscious charging - Development of uniform principles as part of the charging offering, focusing on the exchange of information about grid capacity and rollout.</p>
III	<p>Attention for the user - To date, not much has been done to boost enthusiasm among users and employers for smart charging, and yet we know little about how (new) users perceive smart charging. Initiatives were above all focused on developing technology and policy.</p>	<p>Communication, knowledge and influencing - Focus on social management, behavioural instruments and knowledge development.</p>
General	<p>'Chicken or egg' in the market - As long as there is no attractive or broad-based offering for smart charging, the demand for smart charging will remain limited and vice versa. As soon as critical mass is achieved, a self-reinforcing effect will occur and scaling up will become more self-evident and take place at a higher pace. National cohesion will be useful.</p> <p>Lack of urgency - To date, insufficient urgency has been perceived among providers, grid operators and public commissioning parties for the scaling up of smart charging.</p>	<p>National programme management - Accelerating the scaling up of smart charging should be organised as a temporary, targeted boost, managed at the level of a nationwide programme.</p>

²² Ten Have, S., Hendriks, A., & Idema, H.-J. (2021). *Verkenning organisatie slim laden*. NAL.

²³ APPM (2022), *Verslag Marktconsultatie, Slim laden voor iedereen*. NAL.

²⁴ ANWB (2022), [Wat kost een laadpaal voor thuis? | ANWB](#), viewed on 1 June 2022

²⁵ EVConsult (2022). *Privaat laden in Nederland*. Ministry of Infrastructure and Water Management

3.4 Guiding principles

SLVI025 operates a set of guiding principles in the elaboration of this approach, and designing the efforts aimed at realising the ambition. These principles have among others emerged from the lessons learned from the Investigation of the organisation of smart charging²⁶. The fact that SLVI025 aims to achieve an ambitious target in a relatively short period calls for choices to be made and rapid action.

Set the market in motion - In this phase of the scaling up process, it is more important that the stakeholders are set in motion and become familiar with smart charging than that all the applications and propositions of smart charging be fully developed, by 2025. We will make targeted choices that result in action, clarity and enthusiasm among the stakeholders. All parties will be encouraged to take up their role.

Focus on the user - All our reasoning is based on the viewpoint of the user. Who are the (future) users and what is important for them?

Allow room for entrepreneurship - We will encourage the scaling up of smart charging by establishing frameworks that offer providers sufficient space for their own initiatives. The more space available for entrepreneurship, the greater the likelihood of an attractive offering for users.

Focus on destination charging - The greatest added value of smart charging is generated at locations where a user spends more time. For the most part these are home and work locations. At these locations, there is no urgent need to fully charge a battery in a short timeframe, as for example is often the case in the event of a short

break in a journey, or a short visit. For that reason, the emphasis will be placed on destination charging.

Keep it simple - The future vision on smart charging is often far-reaching, and as a consequence soon becomes complex. To maintain the pace of scaling up smart charging, simplicity is key: it helps keep the approach understandable for all stakeholders.

Focus on what is possible - A number of obstacles can be identified in relation to smart charging which are not likely to be solved in the near future. At the same time, a great deal is achievable. We therefore focus on the main objective, on things that are possible, and in respect of which parties are keen to achieve developments. We must accept a proportion of limitations and exceptions that may currently exist.

Be technology agnostic - The programme does not impose the application of a specific technology or proposition and expresses no particular preference. Instead, the programme creates functional frameworks, and leaves the implementation to the providers. In other words, there is space for control from the charging point, the EV and from the home/building, and for innovative techniques such as vehicle-to-grid (V2G), vehicle-to-everything (V2X) and domestic batteries (and others).

Ensure uniformity wherever necessary - The programme is keen to provide space for local and regional context, interests and solutions, but wherever necessary we will take control and together with the stakeholders, will provide uniform, nationwide agreements and frameworks.

²⁶ Ten Have, S., Hendriks, A., & Idema, H.-J. (2021). *Verkenning organisatie slim laden*. NAL.



Action-based learning and adjustment - Every year, SLVI2025 will evaluate the effectiveness of the tools deployed. There will be a moment of reflection on the development of the offering on the market, and the behaviour of EV drivers (in their choices). The lessons learned will result in adjustments wherever necessary. This is best served by a good-is-good-enough attitude. Striving for perfection will create obstacles to the desired movement and acceleration.

4 Insights and frameworks

By 2025, there will be 578,000 EV drivers, of whom 270,000 will make the switch over the next few years. Costs and climate are the primary motives for switching to smart charging. The willingness appears high, but the charging offering must provide sufficient ease and charging guarantee. For that reason, smart charging should be the standard setting, with a simple opt-out possibility. In terms of pricing, the opt-out is expected to be comparable with current cost of charging, while smart charging with the standard setting will be significantly cheaper. By ensuring a charging guarantee with a guaranteed volume of energy over a specified time frame, attractive propositions will be offered to users. On the basis of a profile, providers will be able to optimise the use of the available grid capacity, while taking account of the limitations of the grid, wherever and whenever necessary. The pooling of charging points and the possibility of utilising the available capacity outside peak times will make smart charging even more attractive. To boost enthusiasm among users for this offering, it is essential that a positive image be created in society based on sound information. It is important that users are approached during the purchasing process via reliable channels and with productive communication frames.

This chapter starts with an overview of the relevant insights into (potential) users of smart charging. These insights are translated in

section 4.2 into the principles for an attractive charging offering (subtask 1). These principles are supplemented in section 4.3 with a view to grid-conscious charging (subtask 2). The aim of SLVI2025 is to safeguard the resultant framework for the desired uniform charging offering, in such a way that the benefits of smart charging favour both the user, the provider and society as a whole. Finally, the focus will be on the demand side, with the user's customer journey, which will result in guidelines for boosting enthusiasm among users for smart charging (subtask 3).

4.1 The user

This section focuses on the user: who they are, what they consider important and where they charge.

User segmentation

Table 5 provides a segmentation of the expected number of EV drivers over the coming years²⁷.

Table 5: Segmentation of EV drivers (x 1000)

	2022		2025		New
Private	105	34%	282	49%	176
Business	202	66%	296	51%	93
Total	308		578		270

In this segmentation, we distinguish between private (purchase or lease) and business drivers (lease). In the first group, the EV driver is both the customer of the charging agreement and the user of the charging session. In the second, the employer is the customer of the charging agreement, for example via a lease company, while the role of the user is taken up by the employees. We also distinguish between current EV drivers and new EV drivers who are expected to make the switch to electric driving over the next few years.



²⁷ Refa, N., Hammer D., & Van Rookhuijzen, J. (2021). *Elektrisch rijden in stroomversnelling. Elektrificatie van personenauto's tot en met 2050. Outlook Q3 2021*. ELaadNL

Motives: cost, climate and charging guarantee

Studies among current EV drivers²⁸ reveal that the most important positive motivations for smart charging among users are costs and climate, whereby the cost motivation is relatively more important for the second generation of EV drivers than for the first (current) generation. Given the recent developments in energy prices and inflation, this importance is set to rise further. Precisely how a smart charging session is organised is less important for users. ‘Range anxiety’, the fear of insufficient charging, is the most important negative motivation for current EV drivers in opting for smart charging. One answer to this anxiety is to offer charging guarantee. For the time being, the willingness among current EV drivers to adopt smart charging is high. Whether this applies to the same extent for new EV drivers or employers, is not yet known.

Awareness, willingness and public image among current EV drivers

There is much support for smart charging among users. The awareness of smart charging among current EV drivers in the Netherlands is already relatively high (59%). The willingness to adopt smart charging, at 82%, can be described as high. The National Charging Survey 2021²⁰ reveals that 47% of the EV drivers interviewed has on occasion used smart charging. Moreover, everyone who has used smart charging is neutral to very positive about their experience²⁹. A recent user survey from England shows that users are keen to switch to smart charging if it results in cheaper or more renewable energy³⁰.

²⁸ Duurkoop, T., Hiep, E., Van Biezen, M., & Van Dam, J. (2021a). *Het nationaal EV en berijdersonderzoek*. RVO.; Duurkoop, T., Gardien, L., Hiep, E., & Van Biezen (2021b). *Nationaal Laadonderzoek 2021. Laden van EV's in Nederland*. RVO.

²⁹ Duurkoop, T., Gardien, L., Hiep, E., & Van Biezen (2021b). *Nationaal Laadonderzoek 2021. Laden van EV's in Nederland*. RVO.

³⁰ Evergreen Smart Power (2021). *Smart Charging Trial Findings*. FRED project.

Requirements: ease of use, transparency and influence

This same survey revealed a top 3 of user needs in respect of smart charging. The most important is ease of use. Users want their lives to be made easy and it must be simple to charge the car.

Transparency is another important requirement, that relates to charging guarantee. It must be clear during every charging session what the user can expect and at what price and subject to what conditions. All these details must be transparent for the user. Lack of transparency for (normal) public charging is still in the top 5 of perceived obstacles, for users. Here, too: the process must be simple. A surplus of information, for example about how the charging session was made possible, is counterproductive because it generates cognitive stress³¹. Finally, the user wants to be able to exercise an *influence* on how charging is carried out, and to have the option to change the setting per charging session and as standard, as required.

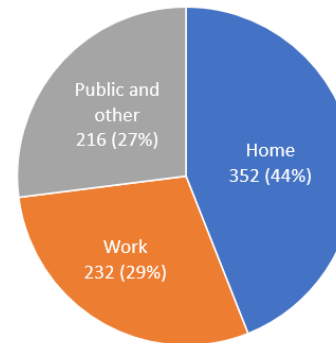


Figure 2: Charging locations 2025 (x 1000)

Charging locations

In 2025, we expect to see 800,000 charging points, of which 44% at home locations, 29% at work locations and 27% in public and (other) semi-public locations³². For the time being, the majority of EV drivers are home chargers³³. In 2021, 60% of all electric kilometres were charged at home, in private locations.

³¹ ElaadNL, Alliander en The Incredible Machine (2021), *De Transparantie Laadpaal*. <https://www.youtube.com/watch?v=M32bzsBswAk>

³² Refa, N., Hammer D., & Van Rookhuijzen, J. (2021). *Elektrisch rijden in stroomversnelling. Elektrificatie van personenauto's tot en met 2050. Outlook Q3 2021*. ElaadNL

³³ Duurkoop, T., Gardien, L., Hiep, E., & Van Biezen (2021b). *Nationaal Laadonderzoek 2021. Laden van EV's in Nederland*. RVO.

This is 13% more than in 2020. The ‘charging ladder’ whereby where at all possible, private charging takes precedence over the public charging, is the underlying principle in national policy. This will help prevent unnecessary pressure on parking spaces and the overburdening of public charging points. In the big four cities (the so-called G4: Amsterdam, Rotterdam, The Hague and Utrecht), additional measures will be taken to safeguard this principle³⁴.

4.2 Attractive charging offering

The first subtask of SLVI2025 is to realise an attractive, broad-based, large-scale offering for smart charging, for users and employers. Ten Have et al.³⁵ recommend that uniform frameworks be established as a basis for the desired charging offering, based around smart charging. In the establishment phase of SLVI2025, the operating principles were elaborated, partly on the basis of insights about the users³⁶ and consultations among various relevant groups of stakeholders. Below, the underlying principles are explained, followed by the considerations.

Principles for an attractive charging offering

In the desired charging offering, smart charging is the standard setting for every AC charging session at a charging location with a domestic use connection or at a charging hub suitable for EVs weighing less than 3500 kg. These applications require no input from users who are thereby assisted in charging more cheaply and/or more sustainably. Users receive a guaranteed volume of energy within a specified timeframe, geared to destination charging, at a predetermined price. Users wishing to start charging

immediately after plugging in can make use of an opt-out. In terms of price, the opt-out will be comparable with the cost of normal charging at present, while smart charging subject to the standard settings will be significantly cheaper. This applies for all public, private and work locations. To make this possible, the principles that emerged from the consultation process with stakeholders in the establishment phase of SLVI2025, have been elaborated in the form of a schedule of requirements for providers. See Bijlage C for details.

Considerations

- These operating principles take account of and guarantee the motivations and needs of users.
- At the same time, the standard settings and the related volume of smart charging sessions offer providers more guarantee, clarity and space for developing an attractive proposition for those same users, whereby smart charging can be offered more cheaply than standard charging, while still maintaining a margin for the provider.
- It is important that at the start of a charging session, smart charging requires no (additional) action³⁷. With smart charging as the standard setting³⁸, users can quickly become familiar with smart charging as part of their (subconscious) everyday routine.
- Users have expressed the importance of having an influence over the charging session. For that reason, it is desirable that a simple opt-out be offered. All the pilots have shown that the opt-out is not often used, but for the confidence of users and the adoption of smart charging, it is important that the possibility is available³⁹. A ride to a quick charger forms in a large and growing

³⁴ Leusink, B. & Remkes, E. (2022). *Privaat en sempubliek laden. Deel 1 De Analyse en Deel 2 De Aanpak*. G4 + MRA-Elektrisch

³⁵ Ten Have, S., Hendriks, A., & Idema, H.-J. (2021). *Verkenning organisatie slim laden*. NAL.

³⁶ see section 4.1 The user

³⁷ Zweistra, M., Gardien, L., Schoenmaekers, L., Wargers, A. & Schuring, F. (2021). *Eindverslag proef Variabele Netcapaciteit in Overijssel en Gelderland. Overijsselse en Gelderse aanpak voor slim openbaar laden*. Alliander, ElaadNL en Enexis.

³⁸ In other words, application of the behaviour instrument ‘Choice architecture’

³⁹ Van Bokhoven, P., Gardien, L., Klapwijk, P., Refa, N., Berende, M., Van Zante, A., Heinen, J.W. & Kats, R. (2020). *Charge Management of electric vehicles at home. Testing smart charging with a home energy management system (‘Flex achter de meter’)*. ElaadNL, Enexis Netbeheer, Enpuls en Maxem; Evergreen Smart Power (2021). *Smart Charging Trial Findings*. FRED project.

part of the Netherlands a real additional alternative for EV drivers who want to be charged quickly, before the car arrives at its destination.

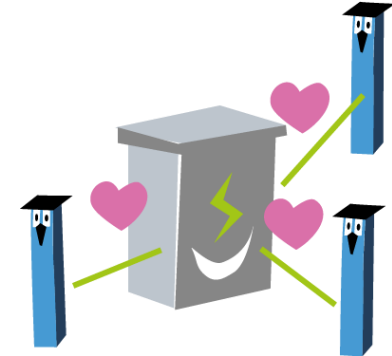
- Offering charging guarantee can be in conflict with grid-conscious charging and the available flexibility in a charging session, and as a consequence developing an attractive offering for the same users⁴⁰. Offering charging guarantee by delivering a guarantee of a certain volume of energy in a specific timeframe offers a better balance than guaranteeing a minimum loading speed throughout the entire charging session or a range/energy guarantee for the initial part of the charging session.
- Recently introduced EV models are equipped with a battery with such large capacity that it would be uncommon for them to be driven empty in the course of a single day. As new EV models are introduced in the future, battery capacity is expected to increase even further.
- Users with a form of ‘range anxiety’ or with a smaller battery have been taken into account in offering a simple opt-out.
- An average charging session at home and work locations lasts between 10 and 12 hours (uninterrupted time) whereby between 22 and 36 kWh are charged. The average state of charge (SoC) at the start of a charging session at present is between 40-55%. 26% of current EV drivers at present have the habit of driving until the battery is almost empty⁴¹.
- Uniformity and simplicity are important for users. It is therefore desirable that the charging offering for all types of charging locations (public, semi-public, private) remains as similar as possible. For this reason, at public charging locations, no distinction is made between users with a charging agreement and users with no agreement.

⁴⁰ Van Dijk, J., Van Eijdsden, B., De Geus, S., Van Leeuwen, J., Verheijen, L., & Plantenga, R. (2022). *Smart charging position paper. Minimum Load Requirement: Well-intended but a Smart Charging obstacle*. TotalEnergies.

⁴¹ Duurkoop, T., Gardien, L., Hiep, E., & Van Biezen (2021b). *Nationaal Laadonderzoek 2021. Laden van EV's in Nederland*. RVO.

4.3 Grid-conscious charging offering

The second subtask of SLVI2025 is to ensure the uniform nationwide rollout of grid-conscious charging: charging within the limitations of the locally available grid capacity. The smart charging of electric cars creates a possibility for preventing local peaks in demand and the resultant congestion. In addition, use of the locally available grid capacity can be optimised. In the establishment phase of SLVI2025, uniform operating principles were elaborated for grid-conscious charging, partly based on the consultation with various groups of stakeholders. There is broad understanding and acceptance for the value and necessity of grid-conscious charging. The explanatory notes to these operating principles appear below, followed by the relevant considerations. Grid-conscious charging has also been made an integral part of the elaborated schedule of requirements for the charging offering in Bijlage C.



Principles for grid-conscious charging

The technical capacity of an individual charging point, often 11 kW, with 17.3 kW for the grid connection⁴², will at all times be fully available for use at the vast majority of charging points. Until 2025, at a limited number of transformer stations⁴³ in the Netherlands, at peak moments (for example between 5 and 8 p.m.), there will be a real risk of local grid congestion. In such cases, the transformer will have to be preventively relieved. In that situation, at specific locations, during specific times, the maximum available capacity at a

⁴² In this section we assume a standard 3 x 25 Ampere connection.

⁴³ Also known as a medium voltage area that can contain one or more transformers and to which multiple charging points in an area are connected.

charging point is restricted, in the worst case scenario to 4 kW. Even in these cases, a charging volume is guaranteed⁴⁴. During a charging session lasting 6 hours or longer, 30 kWh or more will be charged, albeit that there is less freedom for managing (part of) the charging session according to costs and/or climate.

Outside these peak moments, additional grid capacity is often available, that is not utilised. This is a result of the electricity consumption in the area but may also be due to the fact that not all charging points are occupied, or because not all EVs charge at maximum charging speed continuously and/or simultaneously.

The underlying principle for grid-conscious charging is that the grid operator shares information about the locally available grid capacity with the providers, so that they can offer charging within the limitations of the local grid. The available capacity for a charging session consists of three building blocks, each of which are discussed individually, below.

1) Basic capacity per charging point: As the first building block, users and providers can assume a guaranteed basic capacity of 4 kW per charging point, for the charging of an EV.

In the vast majority of situations, sufficient capacity will be available in an area. To utilise that capacity, wherever possible, providers will employ what is known as the pooling technique. In addition, grid operators will make additional capacity available, wherever possible.

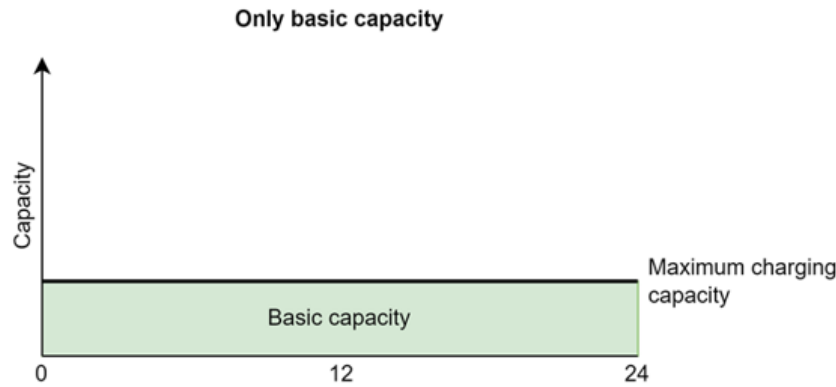
2) Pooling: providers can combine the available basic capacity from multiple charging points, within a single transformer station. Using this technique, providers can then offer to charge EVs with a higher maximum capacity⁴⁵. For example: a provider has 3 private charging points with a basic capacity of 4 kW in a neighbourhood, at which at that moment he wishes to charge a single car at 1 charging point. By pooling, a total of $3 \times 4 = 12$ kW is available. The car can then be charged at 12 kW, on condition the car is technically equipped to do so.

3) Additional capacity: during the course of the day, there is generally more than sufficient capacity available from a transformer station. Via a profile of the additional grid capacity, that additional capacity will be made available to the providers in the neighbourhood. The additional capacity is shared equally across all charging points among the providers wishing to make use of it.

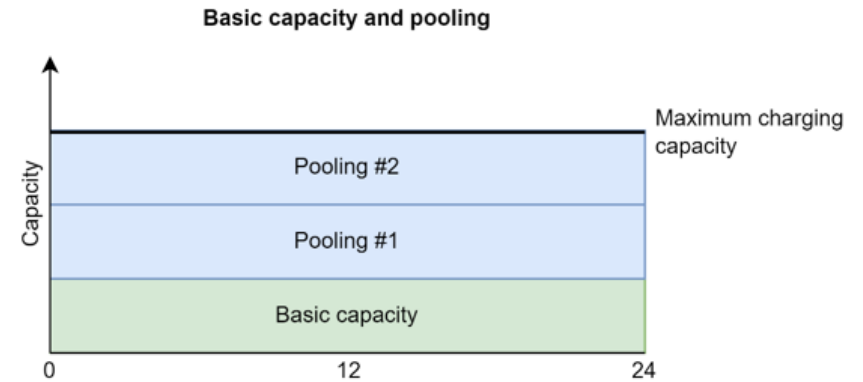
The combination of these building blocks determines the maximum available capacity for charging an EV whether or not smartly. Figure 3 provides a further explanation of the combination of the building blocks. In practice, this means that if the three building blocks are added together, as a rule, 17.25 kW of power is available per charging point (the technical maximum), although for specific locations and at specific moments, this will be less.

⁴⁴ In accordance with the standard settings as outlined in section 4.2.

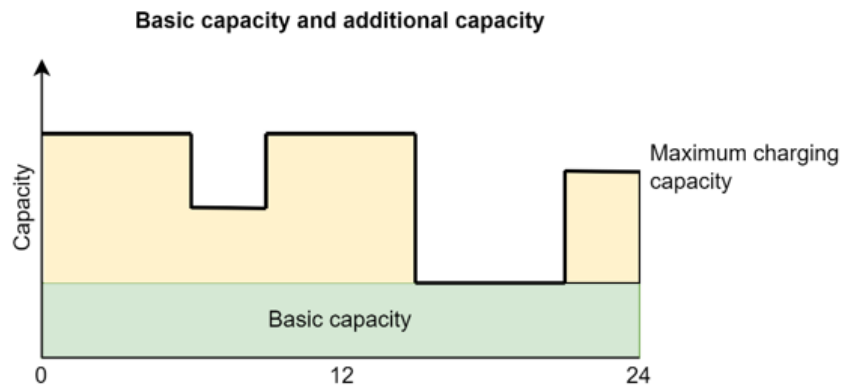
⁴⁵ Among others in the project Flexpower3, experienced and utilised in practice. [FLEXPOWER 020 - HvA](#)



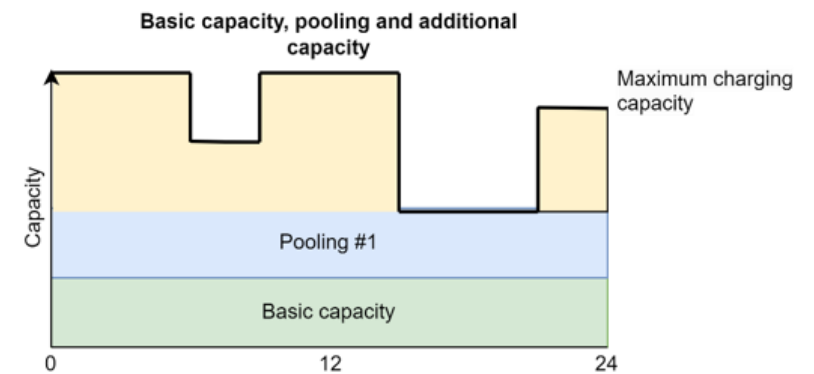
The provider only makes use of the basic capacity of 4 kW. Possibilities for pooling and/or additional capacity are not used. The maximum charging capacity is equal to the available basic capacity.



The provider makes use of pooling. As a result, the available capacity from the various charging points can be combined. The maximum charging capacity (in combination) is increased, as far as technically possible.



The provider makes use of additional capacity. During the course of the day, more capacity is available at specific moments. The maximum charging capacity fluctuates within this availability.



Combination of the above.

Figure 3: Possible combinations of building blocks for grid-conscious charging with optimum use of available grid capacity

Considerations

- The cause of the absence of a natural stimulus for grid-conscious charging is that the domestic use rates currently charged by the grid operator are not cost-reflective. The costs for a grid connection are based on an average brief peak in capacity usage per household of 4 kW, while technically, 17 kW can be achieved. For the charging of an EV, 11 kW of that technical capacity are often used.
- With the expected new domestic use rates, starting in 2025, cost reflectivity should be guaranteed, but it is not desirable to wait until that time. Wherever possible, it is important to prevent the growing number of EVs causing grid congestion over the next few years. Even if this were to result in a limited number of incidents nationally, the damage to the public image of both electric driving in general and for the grid operator would be too great. Moreover, this approach will help prevent unnecessary social costs for reinforcing the grid.
- The operating principles tie in with the current dominant thinking among grid operators for the development of the new domestic use rates expected by the end of 2025. A positive side effect is that it will enable flexible introduction if grid-conscious charging is perfected ahead of that date.
- The Netherlands currently has an estimated 80,000 medium and low-voltage (MV/LV) transformer stations. Several hundred of these are already subject to a realistic risk that grid congestion will occur at peak moments between now and 2025 (for example between 5 and 8 p.m.).
- Outside these peak moments, additional grid capacity is often available, that is not utilised. This fact offers extra opportunities for greater flexibility in a smart charging session and an (even) more attractive offering for users. Take for example charging with wind and solar energy in off-peak periods (in the middle of the day or the middle of the night, respectively).
- Restricting the available capacity for grid-conscious charging will reduce flexibility in a charging session. It is therefore important that this only be done at locations and at moments where there is a realistic risk of grid congestion.
- Grid-conscious charging should become a fixed element of smart (charging) in the social perception. Whereas smart charging offers the user advantages (in terms of costs and climate) on the one hand, at the same time it can be a social instrument for ensuring that charging is carried out in a socially responsible manner, with the grid not being burdened more than necessary. This in turn will result in a fairer distribution of the available grid capacity among users of the grid in the neighbourhood.
- One point that deserves attention is user perception. The sentiment could be 'we always used to have far more capacity for the same price'. It is important to realise that this will apply to all Dutch people, when the new domestic use rates are introduced. Via grid-conscious charging under SLVI2025, EV drivers will be confronted with this situation earlier, and will have the opportunity to become familiar with it, at an earlier stage. The approach angle could be: 'At your destination you will not even notice that your vehicle is being charged smartly and grid-consciously'.
- One point for attention when implementing a profile in a neighbourhood is that we must avoid a peak still occurring immediately after the original moment⁴⁶.

⁴⁶ Van Amstel, M. (2018). *Flexibility system design for electric vehicles. Performing congestion management for the DSO*. PDEng Thesis. University of Twente.

4.4 Communication and influencing

The third and final task for SLVI2025 is to boost enthusiasm for smart charging among users and employers. The central element of this task is: how can users and their employees be supported and encouraged to adopt smart charging as the new standard. The intended effect is to allow them to opt for the benefits of smart charging, without any worry. The availability of an attractive offering is an absolute precondition⁴⁷. In other words, an offering according to which the basic needs of users are met. Today, little has been done to increase willingness among users and employers, or to boost demand for smart charging. This then offers an opportunity and a challenge.

Effective interventions in relation to behaviour and communication

To boost the enthusiasm among users for smart charging, we plan to employ various forms of communication and influencing. The approach of SLVI2025 is based on discussions with experts, consultation of representatives of users and consumers and providers and studies⁴⁸ conducted in the establishment phase. Use was also made of general insights from social psychology, behaviour influencing and marketing.

To design effective interventions, it is essential to take into account the specific combination of the following elements: the segment of the target group of which the (potential) user forms part⁴⁹, the phase of the customer journey the user has currently reached, the channels and actors to be employed with whom the user is in contact and the form and content of the message. These elements are all discussed below

⁴⁷ See section 4.2 Attractive charging offering

⁴⁸ Taalstrategie (2022). *Framing slim laden. Rapportage kwalitatief onderzoek naar de publieke frames rond slim laden.*

Customer journey

The susceptibility of a potential user to influencing differs in each phase of the customer journey. This is because during each phase, other issues are important to the user. Table 6 on the next page shows the individual phases we have identified in the purchase and adoption process and the relevant questions in those phases. There are two types of customer journey. For each phase, the table suggests the most effective approach in that phase.

The first customer journey involves an EV driver or employer wishing to enter into a charging agreement with a provider. For new EV drivers, their customer journey is far more broadly focused, on the switch to electric driving. Among current EV drivers, the switch to smart charging requires a change to their everyday, automatic routine - in this case charging. This is always difficult. Studies have shown that routines can best be changed in situations when the context is already changing, for example when moving home, when changing employer or when purchasing a new car or, as is the case for new EV drivers, when they switch to electric driving. It is therefore essential that when reconsidering routines, the relevant information about smart charging be provided, or supplied via the right channels.

The second customer journey relates to an EV driver who purchases a charging session at a (semi) public location at which smart charging is set as the standard.



⁴⁹ See section 4.1 The user

Table 6: From the customer journey to an effective approach

#	Phase	I - Charging agreement	II - Passive smart charging (public, work)	Effective approach
1	Awareness	Awareness and image of smart charging?	Awareness and image of smart charging?	Ensure the greatest possible awareness and a positive image of smart charging by means of general information provision via various channels, resulting in an environment of positively empowered potential users.
2	Orientation	What should I be focusing on? Where do I find more information?	What does this mean for my charging session? Where do I find more information?	Ensure uniform, factual and accessible basic information about smart charging, that can serve as a reference for potential users, possibly via parties in the chain consulted by potential users, such as user and consumer organisations, providers, employers and local government.
3	Evaluation and purchase	Which charging service should I choose?	What will I get at which charging point here in the neighbourhood, at what price?	Ensure good support for the purchase process among users and employers via reliable channels and actors, with (choice support) tools, targeted information and means of communication.
4	Delivery and commissioning	Accept or change standard settings?	How does this charging point work?	In these phases, communication and influencing should mostly be left to the providers . Continue to monitor for the purpose of knowledge development. It is also important to keep in touch with existing independent communities to exchange experiences, and to motivate each other (for example a low-carbon diet contest), to ask questions and to find support in the event of complaints.
5	Use	Opt-out? What does smart charging mean for me: advantages / disadvantages?	Opt-out? What does smart charging mean for me: advantages / disadvantages?	
6	After care and adoption	Does it fit into my routine?	Does it fit into my routine?	

Channels and actors

During the customer journey, a variety of channels and actors can play a role in informing, communicating with and influencing users. The most effective choice of channels and actors can be determined by the degree of exposure or accessibility in the relevant phase of the customer journey and the perceived reliability by the user. The National Charging Survey 2021⁵⁰ revealed the following picture for current EV drivers in relation to orientation, evaluation and purchase of electric cars (phase 2 and 3).

Table 7: Use of channels and actors in the customer journey

Channel / actor	Consulted	Reliability (1-5)
Online news sites	92%	3.59
Car dealer	44%	3.46
Consumer organisations	43%	4.04
Association of Electric Drivers (VER)	42%	4.21
Friends, family, colleagues	29%	3.87
Employer	12%	4.14

Most notable is the fact that users consider the majority of sources to be between fairly and very reliable, that almost everyone consults online news sites, and that employers are barely consulted, but are nonetheless considered relatively reliable. SLVI2025 ties in with the channels, actors and information sources that now already apply to electric drivers. Over the next three years, these sources are expected to remain the most important sources of information; both for current and future drivers.

⁵⁰ Duurkoop, T., Gardien, L., Hiep, E., & Van Biezen (2021b). *Nationaal Laadonderzoek 2021. Laden van EV's in Nederland*. RVO.

⁵¹ See section 4.1 The user

Message and communication frame

The content and form of the message is the final element in determining the effectiveness of communication and influencing. It is important to tie in with the content in respect of the motivations and needs of the user⁵¹ and in terms of form to opt for a powerful communication frame.



A study by Taalstrategie⁵², conducted during the establishment phase on behalf of the SLVI2025, answered the question: what are effective frames for expressions aimed at facilitating potential users of smart charging, in their adoption process? There are already a variety of frames in relation to smart charging, in the public discussion. In each of those frames, public image, facts and conviction are heavily intermingled. The art lies in matching communication expressions with the prevailing frames that can be made productive. One potential pitfall in the communication process is trying to use (often too many) substantive arguments to show users with a negative opinion why that opinion is in fact wrong.

Conversely, there are a number of positive, usable frames, particularly for the themes costs, climate and use. In the study, these positive frames were given a working name. Together, these frames form the basis for developing effective communication expressions, but they still require further elaboration. SLVI2025 has opted to employ a combination of the following frames:

- **Solution for hire** (working name) - Theme: money
EV drivers can earn from their stationary EV, by hiring out their battery to top up the energy system, if necessary.

⁵² Taalstrategie (2022). *Framing slim laden. Rapportage kwalitatief onderzoek naar de publieke frames rond slim laden*.

- **Positive impact EV** (working name) - Theme: climate
Thanks to smart charging, your EV emits less CO2 and ‘leaks’ less solar and wind energy during off-peak moments in demand. The result is a structural reduction in demand for grey energy.
- **Easy optimisation** (working name) - Theme: use
Smart charging is user-friendly because it supports the EV driver in optimising the charging process, while still giving the driver control of the process.

It is possible to combine a limited number of compatible frames, like these, but the key is to avoid the message becoming overburdened, rather than clearer. Of course, all market parties are free to develop their own communication message, appropriate to their product and target group.



Monitoring and knowledge development

Finally, influencing behaviour is not an exact science. It therefore remains vital that we continue to monitor the effect of our efforts and the development of new knowledge about users, and the use of smart charging. The outcome will be more learning and the possibility of fine tuning the approach to interventions on the demand side, during the course of the programme.






5 Activities














This chapter provides a brief overview of the efforts to be made by SLVI2025 between now and 2025 in order to realise its ambition as well as identifying the various players and their roles. These efforts include activities, measures, projects or interventions that will deliver real results.

Table 8 provides, and overview of the efforts planned by SVLI2025 between now and 2025. Bijlage B contains an Objective-Efforts network that provides a coherent picture of which efforts (activities) will contribute to which objective.

Table 8: Overview of activities

Key
Activities contribute to the following objectives:

-  I More attractive, broader based and larger offering of smart charging
-  II More grid-conscious charging sessions
-  III Greater willingness and demand for smart charging among users and employers

Section	#	Activity	Responsible parties	I	II	III	Type
5.1	1	Safeguarding an attractive and grid-conscious charging offering	NAL regions, grid operators, providers				Self-regulation / co-regulation
	2	• Via concessions and permits	Employers' organisations, lease companies, providers				
	3	• Via agreements with employers' organisations	Sector organisations providers				
	4	• Establishing a leading coalition of providers	Sector organisations providers, independent body				
		• Developing a label					
5.2	5	Encouraging the purchase of smart charging infrastructure	SLVI2025 to be confirmed				Financial stimulus
5.3	6	Enabling grid-conscious charging	Grid operators and providers				Facilitation
5.4	7	Boosting enthusiasm among users for smart charging	SLVI2025				Social management
	8	• Updating information base	User and consumer organisations				Provide information
	9	• Information provision and influencing public image	Sector organisations providers				
		• Supporting the purchase process					
5.5	10	Knowledge development	SLVI2025, providers User and consumer organisations Knowledge institutions ELaadNL, NKL, RVO				Learning

5.1 Safeguarding an attractive and grid-conscious charging offering

Action 1: Safeguarding the charging offering via concessions and permits

In the establishment phase, the NAL regions together recognised that there are possibilities for the introduction of passive smart charging at public charging points. There is a need for a clear, national framework that can then be used in all NAL regions. At the same time there is a need for the freedom for municipalities to operate a local policy. For example, in the field of sustainability, and in respect of specific locations where parking pressure is high. Based on the operating principles developed to encourage an attractive and grid-conscious smart charging offering⁵³, both are possible.

This action is focused on safeguarding these operating principles in new concessions and permits. The NAL regions suggest that similar possibilities are also achievable in the majority of current concessions. As a first step in this campaign, it is important to reach agreements with the NAL regions about the implementation and cooperation with SLVI2025. Agreements are also needed with the grid operators about the implementation of grid-conscious charging⁵⁴. The next key issue will be to determine the impact of the application of smart charging in new and current concessions: possible financial implications, other obstacles and how to deal with them. Based on standard texts for concessions, NAL regions can include requirements for smart charging in their concessions. That will require specific agreements between NAL regions and CPOs, for each current concession. The aim of the NAL regions is to monitor the occupancy levels at locations where parking pressure is high, or where charging point hogging appears to be an issue. This will allow them to test and experience whether they need to work with non-standard locations. SLVI2025 will make it possible for the NAL

regions to exchange knowledge and experiences, and where necessary to further develop the methods to be employed or the operating principles.

Intended results

- Framework for charging offering safeguarded in all new and current concessions

Responsible parties

- NAL regions
- Concession holders
- Grid operators




Action 2: Safeguarding the charging offering via agreements with employers' organisations

Employers' organisations VNO-NCW and MKB Nederland have prepared a common *New Course* focused on sustainability and corporate social responsibility. Their views on sustainable mobility are in line with the objectives of SLVI2025. Via the 'Anders Reizen' coalition ('travelling differently'), employers are putting these sustainable ambitions for mobility into practice. Moreover, from 2023 onwards, large employers are required to provide details of the home-work travel and business travel of their employees. The agreed target is to reduce CO2 emissions by 1 megaton, in 2030. If the organisations in question remain on course, they will only be required to report on their activities. If they fall behind, from 2025 onwards, they will be required to introduce smarter and more efficient travel.

The intention is for employers' organisations to fulfil an active role in scaling up smart charging, focused on costs, climate and the limitations of the grid. SLVI2025 wishes to enter into agreements with employers' organisations on these issues. They will be asked to

⁵³ See sections 4.2 and 4.3 and Bijlage C

⁵⁴ See section 5.3



mobilise employers in the two roles they play, namely as commissioning parties for business driving by their employees and as location owners and commissioning parties for charging infrastructure at work locations. The proposal is that employers impose requirements on the charging services they purchase in line with the same operating principles for the required charging offering, as contained in this document, and the principles the NAL regions intend to apply. As part of the process, the Smart Charging label still to be developed can be used as a purchase criterion (see the section below). In this way, they will ensure that an SCR-ready charging infrastructure is installed at work locations and that smart charging becomes the standard setting. SLVI2025 can offer support in the form of specific information in the form of a toolkit for communication campaigns for sector organisations. SLVI2025 will also facilitate the process through knowledge sharing, the exchange of experiences and inspiration. Employers who take up this challenge are then eligible for financial support when they purchase their charging infrastructure (see section 5.2).

Intended results

- Signing of collaboration agreement between employers' organisations and lease companies (media moment)
- Campaigns conducted by sector organisations
- Charging offering at work locations in line with the SLVI2025 frameworks

Responsible parties

- VNO-NCW | MKB Nederland
- Sector organisations employers
- Lease companies

Action 3: Establishing a leading coalition of providers

SLVI2025 aims to facilitate sector representatives in the establishment of a leading coalition of providers of smart charging services. This will help set the market for providers in motion. The

precondition for joining this coalition is ideally the ambition to be a pioneer on the market, commitment to the introduction of SCR-ready charging infrastructure (at all charging locations) and in line with the framework for the charging offering proposed by SLVI2025. As soon as possible, the further ambition will be added, namely satisfying the requirements of the Smart Charging quality label (see below). One possibility is to start with providers in the public domain where in the near future smart charging will become a requirement in concessions, before then calling upon other providers to join up.

This leading coalition will be offered a number of privileges, for example specific exposure via press releases from SLVI2025, own online channels and via references on online channels of users' organisations, as well as fulfilling a leading role in the development of the Smart Charging quality label.

Coalition members will also be entitled to submit proposals for the practical elaboration of such issues as (price) transparency, the physical implementation of the opt-out, etc. Collaborating in solutions for (data) technical challenges, consultation on the regional approach and challenges, knowledge development and knowledge exchange and inspiration are also on the agenda.

Intended results

- Establishment of a leading coalition of providers
- Sector agreement with signed undertaking on smart charging?
- Further support for high-potential proposals for the scaling up of smart charging in practice
- The development and exchange of knowledge of smart charging and practical use

Responsible parties

- DOET, eViolin, NVDE
- Users' organisations (references)

Action 4: Developing a label

Through this campaign, SLVI2025 wishes to encourage the providers to develop a label (with a recognisable logo) for smart charging services; this will also be a collective brand label. The idea is for the label to be based on the operating principles of an attractive and grid-conscious offering as described in this action plan. Providers can use the label as an identifier and in support of their (visual) communication of a proposition for EV drivers, as well as the guarantee of a minimum quality level.

A legal entity (association or foundation) will deposit the label, with the accompanying requirements. The holder can then grant the affiliated providers the right to use the label, if the requirements are satisfied. It is important that the holder be impartial. To obtain a label, a provider will commission an independent body to conduct a conformity assessment of the charging offering, for example through testing or inspection.

Critical success factors are broad support among providers and sufficient participants in the sector. The leading coalition of providers (see action 3) can play an important role. It is worth investigating the value of having the label assessed at some point in the future for compliance with the internationally agreed requirements from the Council for Accreditation (national accreditation body), which will result in formal certification.

Intended results

- Conditions developed for quality label and logo
- Conformity assessment implemented
- Label and conditions deposited by a legal entity
- Label as a marketing tool for providers

Responsible parties

- Sector organisations providers

5.2 Encouraging the purchase of smart charging infrastructure

Action 5

Less than half of home charging points are capable of smart charging, while more than half of users are required to pay for the charging point themselves. The investment, of at least €2000, represents a considerable obstacle for many private individuals. Many employers feel that by switching to electric for their lease fleet, they are already taking an important step forward, towards the future. Attention for and interest in gaining further knowledge about the unknown and at first glance possibly complex issue of smart charging will need encouragement.

SLVI2025 aims to encourage smart charging by private individuals and at work locations, on the basis of the principle *one good turn deserves another*. SLVI2025 aims to promote the purchase of SCR-ready charging infrastructure, imposing the condition that the charging service must be purchased in line with the operating principles of SLVI2025 and/or a smart charging label. This will first require an investigation of the possibilities. For example, via subsidy or via the MIA/VAMIL tax rebate schemes⁵⁵. Also relevant is the segmentation of the target groups:

⁵⁵ [Milieu-investeringsaftrek \(MIA\)/Willekeurige afschrijving milieu-investeringen \(VAMIL\) \(belastingdienst.nl\)](https://belastingdienst.nl)

- New EV drivers with an option for a charging point on private property
- Current EV drivers already in possession of a non-SCR-ready charging point on private property
- With the same segments for owner associations and employers, whereby the number of charging points and the amount of excavation work for each connection will differ.

A positive side-effect will be the eradication of type 2 charging, thereby improving the overall safety of home charging (risk of short circuit as a consequence of demand on the electricity meter over long periods of time). Moreover, in the market consultation (ref.), providers indicated that the prospect of a promotion scheme will encourage providers to develop an offering that satisfies these conditions, in good time, and which offers them an opportunity to attract users by pointing out the available measure to them.

Intended results

- Investigation completed and form of promotion chosen
- Promotional measure elaborated and prepared
- Promotional measure implemented, annually adjusted

Responsible parties

- SLVI2025: investigation in consultation with Ministries
- Implementation: to be determined, based on (political) decision making on the results of the investigation

⁵⁶ See section 4.3 Grid-conscious charging offering

5.3 Enabling grid-conscious charging

Action 6

Grid-conscious charging helps avoiding local peak loads. To make that possible, information about the available grid capacity is required. The idea is to work with a grid profile that at every moment of the day informs providers of the maximum available grid capacity for charging. What that means effectively is that at certain moments in the day, and at specific locations, there may be less capacity available at a charging point, than the technical maximum.⁵⁶

Together, and in collaboration with the other cooperation partners, the grid operators will elaborate the national uniform conditions which determine whether at a specific location and a specific time, there are reasons for not providing the full (additional) grid capacity for a charging session. Among others it is important that clarity is achieved on the factors and variables on the basis of which the scale and duration of the restriction is determined, with the basic capacity of 4 kW as the lower limit, and how long in advance this information should be passed on to the providers and (public) commissioning parties. That same clarity is also needed so that sound agreements can be arrived at within concessions, between the concession-awarding parties and the providers.

Broadly speaking, grid operators can generate those grid profiles according to three methods: 1) modelling; 2) via top-down measurements in the system; 3) via aggregated measurements bottom-up from the smart meter, at the connection. These methods are shown in ascending order in terms of precision but also costs, complexity and lead time. The scaling up of smart charging calls for fast action and as a consequence a pragmatic balancing act. Moreover, national standards will have to be developed for how

and in which format the information will be shared. Providers will have to implement the application of a grid profile in their charging services. Once developed, the national standard for grid-conscious charging will have to be tested, after which the system can be rolled out, in managed phases.

Grid-conscious charging on the public charging infrastructure will have the side effect that concession holders can already become used to managing for a lower basic connection, in advance of the new domestic use rates to be introduced in 2025. At private locations the same will apply to users.

Intended results

- Uniform and agreed conditions for grid-conscious charging
- Uniform frameworks and methods for determining grid profiles
- Standard format for exchange of grid profiles
- Grid-conscious charging tested
- National rollout of grid-conscious charging

Responsible parties

- Grid operators
- Providers

5.4 Boosting enthusiasm among users for smart charging

Action 7: Updating basic information for electric driving

SLVI2025 aims to provide accessible and uniform basic information about smart charging, that can serve as a reference for users and parties in the charging chain wishing to know more about smart charging. The basic information must be factual, and tie in with the questions in society. For that reason, in establishing this basic information, SLVI2025 intends to work alongside those parties who have insights into both the current level of knowledge and the level of information needs among (future) users.

SLVI2025 is working to introduce smart charging as the standard for destination charging, in other words as a standard part of electric driving and charging. It is therefore essential that the information (to be developed) about smart charging becomes an integral part of the already available information about electric driving and charging. To enhance the findability of this information, SLVI2025 is focusing on the channels already known to (future) users such as user and consumer organisations, car dealerships and lease companies. For online findability on Google, SVLI2025 intends to use uniform terminology (SEO) and Google Advertising (SEA). This will be further expanded by adding information about smart charging or references to external pages, on relevant web pages.

Intended results

- Insight into level of knowledge, questions and information needs
- Basis of relevant, factual, readable content
- Updated basic information / products for electric driving
- Agreements with owners of channels
- Online findability ensured

Responsible parties

- SLVI2025
- User and consumer organisations

Action 8: Information provision and influencing public image

To boost enthusiasm among users for smart charging, it is essential that (future) users become familiar with the phenomenon and that they develop a positive association with smart charging. If during the awareness and orientation phase of their transition process, new EV drivers become familiar with smart charging, they will consider smart charging as a serious option in selecting a charging service.

SLVI2025 will be focused on general information provision and the positive influencing of public opinion. That includes implementing PR activities such as issuing press releases, purchasing advertorials and using other (news) media, reliable and popular experts and/or other influencers.

It is important to work with a uniform and simple story, starting with a productive communication frame⁵⁷: What is smart charging and what are the benefits? Another key to success is collaboration with media and information providers already known to and/or used by the (future) users, such as user and consumer organisations.

Intended results

- Elaborated communication message and frame
- PR plan with interventions, geared to the partners
- Implemented interventions for information provision and influencing

Responsible parties

- SLVI2025
- Collaboration partners

Action 9: Supporting the purchase process by users

In their purchase process, users will come into contact with various parties in the charging chain. Those parties all wish to offer the user sound advice, and be in a position to answer questions about smart charging that are put to them by the users. These may include user and consumer organisations, car dealerships and traders, lease companies, employers and providers. SLVI2025 wishes to provide all those parties with the necessary support in their role in the user's purchase process.

The first step will be to identify the need for support. On the basis of that need, SLVI can develop information products and (the basis for) means of communication, as well as supporting parties and providing forms of knowledge sharing. This can for example take the form of standard toolkits, newsletters and knowledge events. Other possibilities include contributing to the development of online tools (e.g. tools to help future users make choices).

Intended results

- Identified need for support
- Standard toolkit for communication and information
- Support provided and customised activities

Responsible parties

- SLVI2025

⁵⁷ See section 4.4 Communication and influencing

5.5 Knowledge development

Action 10

SLVI2025 intends to deliver knowledge on the following themes, follow up on initiatives and learn from practice:

1. **Users:** current and future users, image, attitude and experiences of smart charging
2. **Use:** type of charging sessions, optimisation targets, preferences, charging guarantee, use of opt-out, disruptions and causes
3. **Charging offering:** development of (smart) charging offering and price setting
4. **Legislation and regulations:** national and European developments
5. **Opportunities** for acceleration: selection of dossiers, for example
 - a. Facilitating a second allocation point
 - b. Smart meter allocation: status and bonus %
 - c. Enabling Renewable Energy Units on home chargers based on current sustainability data
6. **Risks** in the implementation and how they can be managed, for example
 - a. Analysis of the risk (scale, nature) that certain EVs cannot be charged with 4 kW; development of practical workarounds
 - b. Investigation into the cause of disruptions during electric driving and to what extent they relate to smart charging
 - c. Analysis of the risk of charging point hogging and to what extent that relates to smart charging (based on facts and/or in the minds of users)

Intended results

- Elaborated approach to knowledge themes and agreements reached with partners on the measurement and sharing of relevant data
- Studies completed
- Knowledge sharing

Responsible parties

- SLVI2025
- Collaboration partners

6 Governance

The Ministries of Infrastructure and Water Management and Economic Affairs and Climate Policy (I&W and EZK) are the intended commissioning parties, whereby implementation of the action plan is an integral part of the National Charging Infrastructure Agenda (NAL). The task calls upon all the parties that make up the charging chain to take responsibility for the various actions in accordance with their role, based on a recognition of the need for cooperation. Implementation of the action plan will take place within a programme-based approach, with a view to safeguarding coherence and cooperation, with a moment for reflection and reassessment, each year.

6.1 Management

Programme-based approach

This action plan will set targets and identify the course to be followed for the stakeholders in the charging chain, for their cooperation in accelerating the scaling up of smart charging. The targets, sub targets and activities are all closely interrelated. All stakeholders will contribute to the ambition according to their own role and responsibility, and at the same time will have to work closely together. In that sense, it is essential to constantly remain open to new developments and initiatives, in the environment. That in turn requires a programme-based management approach at national level, with a focus on coherence, action-based learning and cooperation, and a management philosophy based on the guiding principles outlined in section 3.4.

Phasing

Decision making on this action plan will be the last step in the establishment phase of SLVI2025. The implementation phase covers the period between 2022 and 2025, with subsequent annual phases. At the end of that period, a disengagement phase is provided for. Each year, on the basis of this action plan, a phase plan will be prepared, with a clear elaboration of the targets, activities, resources, organisation and risk management, for the year in question. There will also be an evaluation and reflection moment each year. The key is to learn from the experiences accrued, and to identify the risks and opportunities that emerge during current and new developments in the environment. The development and necessity of national and European legislation and regulations will also be assessed. These assessments will serve as input for the phase plan for the next year. Wherever necessary, the overall approach and the course to be followed will be adjusted. An interim reflection moment has been planned for the halfway point in the implementation of each phase plan.

Roadmap

The activities in the action plan are mutually dependent in terms of content and time. Bijlage D contains a roadmap that provides an outline planning timetable for the activities, taking account of the following attention points:

- It is important that grid-conscious charging be made possible as quickly as possible (action 6). The sooner grid-conscious charging is available, the sooner it can become part of the charging offering.
- The availability of an attractive offering (actions 1 to 4) is an essential precondition for actively boosting demand among users (actions 8 and 9). The same applies for employers in their role as commissioning party (action 2).
- The greatest impact can be achieved by starting with the guaranteeing of smart charging via concessions for public charging (action 1). This will guarantee the development of a significant offering.
- At the same time, a start can be made on investigating promotional measures for the purchase of smart charging points, aimed at private and work locations (action 5).
- The implementation of the promotional measures (action 5) will be most effective if the offering is already sufficiently well developed, and will be reinforced by activities for boosting enthusiasm among users. The actions will be interlocked, in the following order: basic information (action 7), information provision and image (action 8) and supporting the purchase process (action 9).
- The establishment of a leading coalition (action 3) and development of a quality label (action 4) are closely related.

Action lines

The essence of SLVI2025 lies in collaboration between partners in the chain, whereby the partners themselves are often action holders. Programme management will therefore be implemented along the following action lines (see also Appendix B).

- A. Users
- B. Providers
- C. Employers
- D. Grid operators and government
- E. Information and Knowledge (including programme monitor)

The role of the programme is partly to supervise coherence, cooperation and progress. The programme also has a degree of responsibility for results, in particular in relation to the action lines Users and Information and Knowledge.

Monitoring

SLVI2025 will establish a monitor for four types of data.

1. An effect measurement for the realisation of the programme targets (benefits). Bijlage A provides useful tips for measurable indicators.
2. Measurement of progress of the implementation of the activities in the action lines (e.g. milestones).
3. Effect measurements of individual activities. For example, the effectiveness of a campaign among employers.
4. Measurements that deliver valuable insights in relation to knowledge development (action 10), risk management and image of SLVI2025. For example, knowledge about customer experiences of users and the development of the price of smart charging in relation to normal charging. Also consider such issues as occupancy levels of public charging points (in connection with hogging of charging points), disruptions and their causes.

The collaboration partners can play an important role in certain areas, in measuring and sharing data. SLVI2025 is keen to reach agreement with them on this issue.

Accountability

Accountability will be demonstrated annually, in line with the rhythm of the P&C cycle of the commissioning party. In the meantime, there will be administrative progress reports.

List of sources

- ANP (2022), [Jetten: Nederland moet eind 2022 van Russisch gas af | BNR Nieuwsradio](#), viewed 22 April 2022
- ANWB (2022), *Wat kost een laadpaal voor thuis?*, [Wat kost een laadpaal voor thuis? | ANWB](#), viewed 1 June 2022
- APPM (2022), *Verslag Marktconsultatie, Slim laden voor iedereen*. NAL.
- Letter from the State Secretary for Infrastructure and Water Management dated 15 June 2022, IENW/BSK-2022/118650, [Regionale uitrol laadinfrastructuur | Tweede Kamer der Staten-Generaal](#)
- Boogaard, F. (2022). [Europa tuigt markt voor tweedehands elektrische auto's op, ook voor kleinere beurs | Auto | AD.nl](#). AD, 2 February 2022.
- Duurkoop, T., Hiep, E., Van Biezen, M., & Van Dam, J. (2021a). *Het nationaal EV en berijdersonderzoek*. RVO.
- Duurkoop, T., Gardien, L., Hiep, E., & Van Biezen (2021b). *Nationaal Laadonderzoek 2021. Laden van EV's in Nederland*. RVO.
- ElaadNL (2019). *Smart Charging Guide*.
- ElaadNL, Alliander en The Incredible Machine (2021), *De Transparantie Laadpaal*. <https://www.youtube.com/watch?v=M32bzsBswAk>
- European Commission (2021), *Europese Green Deal*, [Werk maken van de Europese Green Deal | Europese Commissie \(europa.eu\)](#)
- EVConsult (2022). *Privaat laden in Nederland*. Ministry of Infrastructure and Water Management
- Evergreen Smart Power (2021). *Smart Charging Trial Findings*. FRED project.
- Kok, R., Visser, W., Mulder, H., Shiamizadeh, Z., Spijker, B., Duurkoop, T. & Van Ginkel, M. (2021). *Trendrapport Nederlandse markt personenauto's. Overzicht van trends en ontwikkelingen*. RVO en Revnext.
- Leusink, B. & Remkes, E. (2022). *Privaat en sempubliek laden. Deel 1 De Analyse en Deel 2 De Aanpak*. G4 + MRA-Elektrisch
- Ministry of Infrastructure and Water Management (2020), *National Charging Infrastructure Agenda*, [Nationale agenda laadinfrastructuur](#)
- Moorman, S., & Mergelsberg, S. (2021). *Lessons learned Smart Charging Nederland, 2015-2020*. NAL.
- NAL core theme Smart Charging (2021). *Smart Charging Requirements (SCR)*. NAL.
- Netbeheer Nederland (2021). *Het Energiesysteem van de Toekomst. Integrale Infrastructuurverkenning 2030 -2050*.
- Netbeheer Nederland (2022a). *Capaciteitskaarten afname en invoeding elektriciteitsnet*. [Capaciteitskaart elektriciteitsnet](#)
- Netbeheer Nederland (2022b). *Netimpact rapportage laadinfrastructuur*. Per NAL-regio. [Netimpactrapportages • Projecten • ElaadNL](#)
- NKL Nederland en Enervalis (2021). *Smart charging synergies: Conflicten en belangen rondom proposities voor slim laden - een verkenning*. TKI Urban Energy, Topsector Energie.
- NOS (2022), [Netbeheerders willen dat overheid aan 'energieplanologie' gaat doen | NOS](#), viewed 13 June 2022
- Punt, L. (2020). *Optimal EV fleet size for renewable energy integration in the presence of smart charging and V2G*. Erasmus Universiteit Rotterdam.
- PwC (2017). *Smart Charging van elektrische voertuigen. Institutionele knelpunten en mogelijke oplossingen*.

- Refa, N., Hammer D., & Van Rookhuijzen, J. (2021). *Elektrisch rijden in stroomversnelling. Elektrificatie van personenauto's tot en met 2050. Outlook Q3 2021*. ELaadNL
- Rooijers, F., & Jongsma, C. (2020). *Verkenning ontwikkeling CO2-vrije flexibele energietechnieken*. CE Delft.
- RVO (2021). *Laden van elektrische voertuigen, definities en toelichting, versie: januari 2021*.
- RVO (2022). *Electric Vehicles Statistics in the Netherlands, up to and including April 2022*, [Frontpage \(rvo.nl\)](https://frontpage.rvo.nl)
- Scholten, B., Idema, H.-J., Afman, M., & Scholten, T. (2018). *Slim laden must have bij groei elektrisch vervoer*. Enpuls.
- Stichting E-PACT (2022). *Reduceren van CO2 en kosten voor bedrijven*.
- Taalstrategie (2022). *Framing slim laden. Rapportage kwalitatief onderzoek naar de publieke frames rond slim laden*.
- Ten Have, S., Hendriks, A., & Idema, H.-J. (2021). *Verkenning organisatie slim laden*. NAL.
- Tezel, G., Muller, N. (2021). *V2G – waarde en de weg voorwaarts. Strategy&*.
- Van Amstel, M. (2018). *Flexibility system design for electric vehicles. Performing congestion management for the DSO. PDEng Thesis*. University of Twente.
- Van Bokhoven, P., Gardien, L., Klapwijk, P., Refa, N., Berende, M., Van Zante, A., Heinen, J.W. & Kats, R. (2020). *Charge Management of electric vehicles at home. Testing smart charging with a home energy management system ('Flex achter de meter')*. ELaadNL, Enexis Netbeheer, Enpuls en Maxem
- Van Cappellen, L., Jongsma, & C., Rooijers, F. (2022). *Het net slimmer benut!* CE Delft.
- Van den Hoed, R. (2020). *Laden van elektrische auto's op de zaak. Een startgids voor bedrijven*. RVO.
- Van Dijk, J., Van Eijsden, B., De Geus, S., Van Leeuwen, J., Verheijen, L., & Plantenga, R. (2022). *Smart charging position paper. Minimum Load Requirement: Well-intended but a Smart Charging obstacle*. TotalEnergies.
- VVD, D66, CDA & Christenunie (2021). *Omzien naar elkaar, vooruitkijken naar de toekomst, Coalitieakkoord 2021-2025. [Coalitieakkoord 'Omzien naar elkaar, vooruitkijken naar de toekomst' | Regering | Rijksoverheid.nl](#)*
- Zweistra, M., Gardien, L., Schoenmaekers, L., Wargers, A. & Schuring, F. (2021). *Eindverslag proef Variabele Netcapaciteit in Overijssel en Gelderland. Overijsselse en Gelderse aanpak voor slim openbaar laden*. Alliander, ELaadNL en Enexis.

Bijlage A Benefits and indicators

The programme's main targets and the derived sub targets set the course for the efforts within the programme. Below, the programme targets are summarised with the associated benefits (effects). A number of these benefits will only emerge during the second half of the programme (2024 and 2025). With each benefit, an indication is given of who will benefit most in the programme, and what they can expect. The final column provides a translation of the benefits into potential measurable indicators as a real yardstick for the benefits achieved. We will use a number of these indicators to monitor the programme.

Target, sub target	Benefit	Possible indicator
More smart and grid-conscious charging sessions	<i>See Ch1.1. (benefits) and Ch1.3 (vision)</i>	Number of smart charging sessions (%) ⁵⁸
I - More attractive and broader offering of smart charging Type of charging locations: public, semi-public and private	Users and employers enjoy a more attractive and broader offering of smart charging.	
Broader and larger offering: at more locations, more diverse, more providers	Users and employers experience a broader offering. ... at public locations.	Number of charging points (% , location) Number of providers Type of offering (% , location) Number of new concessions (%) Number of current concessions (%)
	... at semi-public locations.	Number of employers locations Number of social locations
More attractive offering: cheaper, more sustainable, better user experience	Users and employers experience a more attractive offering. Providers experience greater freedom to access the value of flexibility via propositions for smart charging.	UX/KTV charging session Price difference with dumb charging (%) Price difference with dumb charging (%) Validity business case How much flexibility per charging session (kWh)
II - More grid-conscious charging sessions	Grid operators experience more grid-conscious charging by users. This enables them to avoid grid congestion. As a result, providers can install more charging points for users and employers .	Number of grid-conscious charging sessions (%) Number of charging sessions with applied profile (%) Avoided investments in grid (€) Number of additional charging points

⁵⁸ : from this it is possible to derive the additional CO₂ reduction (%) from smart charging, and the avoided investments in the electricity grid (€).



Target, sub target	Benefit	Possible indicator
Better information about available grid capacity	Grid operators have an instrument for managing according to the avoidance of grid congestion and providers can charge grid-consciously at their charging points.	Number of transformers known per grid operator (%)
More grid-conscious charging in the offering	Users and employers have the option to optimise their grid connection using smart charging. They will familiarise themselves with the expected new domestic use rates.	Number of grid-conscious charging points in the offering (%)
III - Greater willingness and demand for smart charging Segments of the target group: current EV drivers, new EV drivers and employers.	Providers experience greater adoption of passive smart charging sessions and greater demand for smart charging services.	Willingness for smart charging (%) Number of opt-out charging sessions (%) Number of opt-in charging sessions (%) Number of contracts for smart charging
Greater awareness and more positive image	Providers experience customers who are more open to smart charging, with more interest	Awareness of smart charging (%) Attitude, convictions smart charging Prevailing frames in public discussion
Better information about smart charging	Users, employers and chain parties have simple access to relevant information about smart charging. Information is tailor made and clear.	Traffic on public channels UX/KTV information provision (smart charging)
Better support for purchase and adoption process	Users and employers experience better support in their purchase and adoption process from parties in the charging chain and reliable parties.	Traffic on chain party channels UX/KTV support purchasing process (smart charging)

Bijlage B Target-Efforts Network

Vision

“Smart charging for all 2025”

By 2025, smart charging will be the standard for destination charging in the Netherlands. The timely scaling up of smart charging will deliver an essential contribution to the successful and worry-free integration of electric transport and the renewable production of energy in a stable, affordable and futureproof energy system.

Ambition

More smart charging sessions
By 2025, 60% of all charging sessions will be smart

Targets

More attractive, broader and greater offering of smart charging I

More grid-conscious charging sessions II

Greater willingness and demand for smart charging III

Broader and greater offering

More attractive offering

Better information about grid capacity

More grid-conscious charging in offering

Greater awareness and more positive image

Better information about smart charging

Better support for purchase process

Efforts

Establishing a leading coalition of providers 3

Agreements made with employers' organisations 2

Enable grid-conscious charging 6

Influence public image 8

Update the basic information for charging 7

Support the purchase process 9

Safeguard via concessions and permits 1

Develop a label for smart charging 4

Encourage purchase of SCR charging infrastructure 5

Develop knowledge about users and use 10

Action lines

A. Users

B. Providers

C. Employers

D. Grid operators and government

E. Information and knowledge

Bijlage C Requirements on the desired charging offering

In the establishment phase for SLVI2025, a process has been implemented with the various stakeholders which has resulted in a clear elaboration of the operating principles for an attractive offering for users, including grid-conscious charging. This has now taken the form of a schedule of requirements for providers. The schedule also contains requirements that facilitate knowledge development in respect of smart charging and monitoring for SLVI2025.

Public commissioning parties and employers can use these requirements for the tendering procedures for concessions, the granting of permits or awarding orders. They can also set out the conditions for a process of certification with a label to be developed for and with the providers, whereby a leading coalition of first adopters will take the lead.

Schedule of requirements for desired charging offering

Charging infrastructure

- This schedule of requirements applies to all AC charging points with a domestic use connection and charging hubs suitable for EVs lighter than 3500 kg.
- The charging infrastructure used for supplying the charging offering satisfies the Smart Charging Requirements⁵⁹

Agreement

- Every User who purchases (smart) charging services from a Charging offering at his or her own private charging point must have actively agreed (one time only) with the charging offering from the Provider (agreement).
- Users who opt to make use of charging services at a (semi) public charging point thereby agree to the standard offered smart charging service, unless they have actively entered into a specific agreement for a Charging offering with the Provider in question. This offering then applies to all charging points of that Provider, irrespective of their location.

User preferences

- Together with an agreement for a Charging offering, users will be given the possibility of specifying, altering and saving their standard preferences.
- After taking out an agreement for a charging offering, users will have the opportunity to change their preferences for every charging session.

⁵⁹ NAL core team Smart Charging (2021). *Smart Charging Requirements (SCR)*. NAL.

Smart charging focused on costs and climate

- The Provider will offer at least one smart charging service in its Charging offering aimed at automatic optimisation according to cheaper and/or more sustainable charging. The smart charging service must make use of one of the following possibilities: off-peak rate, dynamic energy rate, system balancing, congestion market, link to renewable energy via own generation; link to renewable energy via solar/wind profile.
- Commissioning parties (location owners) may impose additional requirements on optimisation targets and/or methods based on their own policy, for example in relation to sustainability and the energy infrastructure.
- The Provider is free to add any other type of smart charging services, on condition they tie in with the objectives of cheaper and more sustainable charging.
- Smart charging is the offered charging service set as standard for each charging session.
- Users will have the possibility to make use of a simple opt-out for smart charging, and to charge at maximum available capacity (possibly at a higher rate, requirements on the form of opt-out still to be determined).

Grid-conscious charging

- If the restrictions in the network demonstrate a clear reason to do so, at certain locations and at certain moments, less capacity may be offered for charging, to a level of 4 kW.
- The Provider can receive and process (nationally standardised) information about the available grid capacity, in the form of a grid profile, from the regional grid operator.
- The Provider will charge within the limits of the grid profile, and will secure this knowledge in the offering and transparent communication to the user.
- The Provider / CPO gives permission to the grid operator to use smart meter quarter hour values for the validation of compliance with grid-conscious charging.

Charging guarantee

- The adjustable preferences for charging guarantee at least include the minimum desired energy volume (in kWh) and the time period within which that energy volume must be charged.
- The values for Charging guarantee are set as standard to a time period of 6 hours with a minimum desired energy volume of 30 kWh.
- If at the start of the charging session the Provider has automatic access to State of Charge (SoC) data and the SoC is lower than 20%, without the intervention of the user, the Provider can first charge 10 kWh with the maximum available capacity, after which the charging session can continue according to the (standard) set preferences.

Proposition, communication and marketing

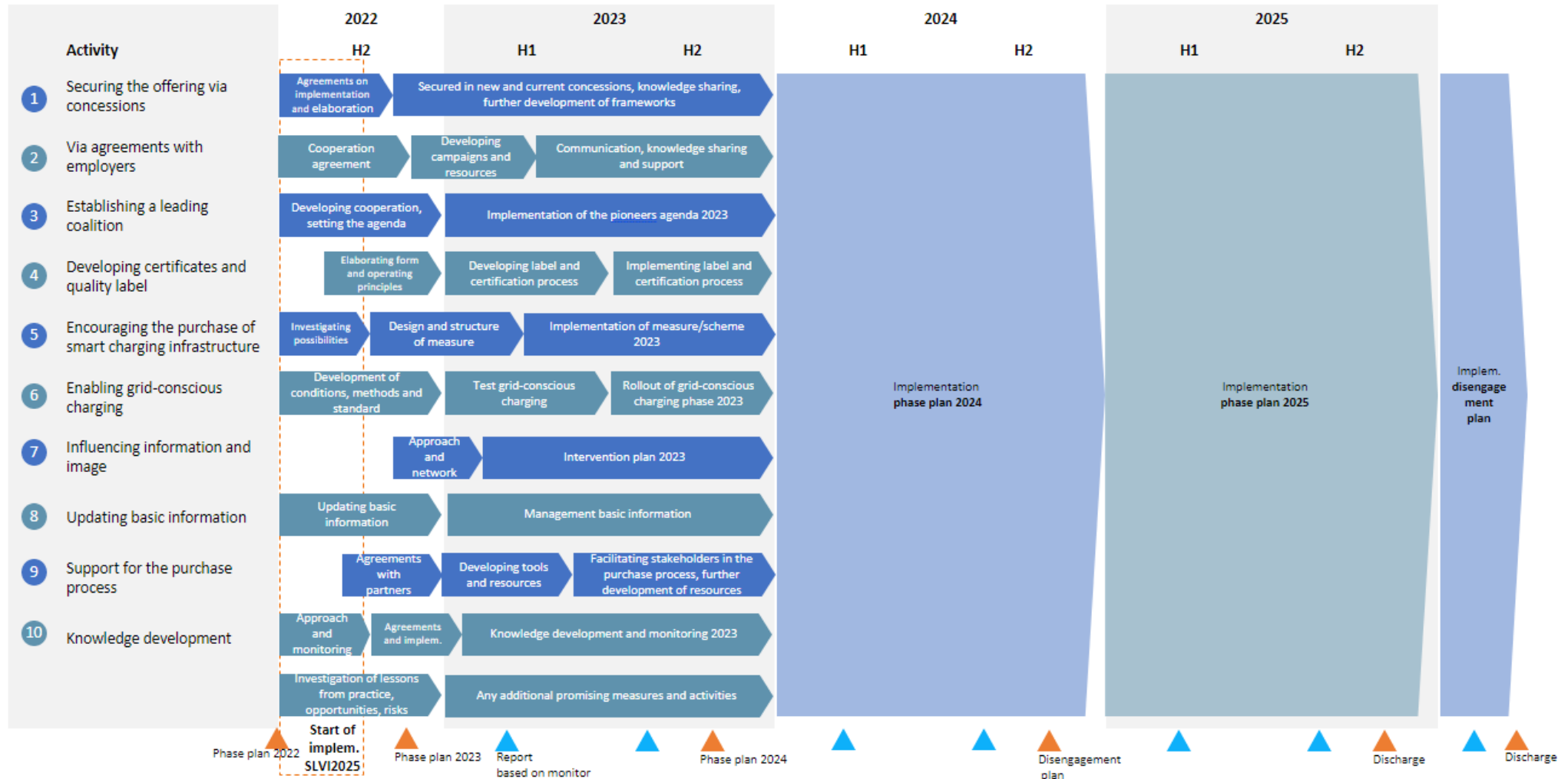
- The Charging offering, consisting of at least the guaranteed energy volume and the accompanying duration and charging price, are clearly communicated to Users. If applicable in the Charging offering from the Provider, this also applies to the guaranteed charging offering (charging speed), the guaranteed range and the charging duration.
- It must be possible to reconstruct and communicate the actual course of the session, after the event.
- The setting of prices for charging on the basis of the opt-out is demonstrably comparable with the current price for normal charging, whereby account may be taken of inflation and development in energy charges. The price for smart charging with the standard setting can be freely chosen by the Provider, but is significantly and perceptibly lower for the User.
- The name/branding, further details of the Charging services and the setting of prices in the Charging offering can be freely chosen by the Provider. This also applies to discounts or additional costs offered or charged to Users by Providers, in the selection by the User of specific Charging services from the Charging offering.

Monitoring and knowledge development

- Each quarter, providers will share anonymised data about all charging sessions and smart charging sessions, backed up by anonymised Charge Detail Records, so that evaluation is possible at aggregated level. The Programme will only publish aggregated information and the outcomes of analyses. No publications will be made about individual Users and/or Providers.
- To satisfy these requirements, the Providers will include the relevant passages in the users conditions.
- For knowledge development, the Provider will cooperate with SLVI2025 on sharing surveys with their Users (maximum two per year).

Bijlage D Roadmap

The planning schedule in this roadmap for SLVI2025 is indicative.





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This document was made possible by contributions from user and consumer representatives, sector representatives, providers on the market, grid operators, public commissioning bodies, employers' organisations and in consultation with experts from the Netherlands Enterprise Agency and the Ministries of Infrastructure and Water Management and Economic Affairs and Climate Policy.

More information available at
www.agendalaadinfrastructuur.nl