Grant number: 769016
Project duration: Sept 2018 - Aug 2021
Project Coordinator: Joe Gorman, SINTEF

HORIZON 2020: Mobility for Growth
MG-4.2-2017
Supporting Smart Electric Mobility in Cities
Project Type: Innovation Action

GREEN CHARGE

greencharge2020.eu

GreenCharge Project Deliverable: D3.1

Stakeholder Analysis Report

Authors: Robin van Scheijndel, Anouk van der Veeken, Arno Schoevaars, Bas Bosma (PNO)

2020 CiViTAS
Cleaner and better transport in cities

www.civitas.eu

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

GreenCharge is recognized as a CIVITAS project that will contribute to cleaner, better transport in Europe and beyond.

Grant number: 769016
Project duration: Sept 2018 - Aug 2021
Project Coordinator: Joe Gorman, SINTEF

HORIZON 2020: Mobility for Growth
MG-4.2-2017
Supporting Smart Electric Mobility in Cities
Project Type: Innovation Action

About GreenCharge

GreenCharge takes us a few important steps closer to achieving one of the dreams of modern cities: a zero-emission transport system based on electric vehicles running on green energy, with traffic jams and parking problems becoming things of the past. The project promotes:

Power to the people! — The GreenCharge dream can only be achieved if people feel confident that they can access charging infrastructure as and when they need it. So GreenCharge is developing a smart charging system that lets people book charging in advance, so that they can easily access the power they need.

The delicate balance of power — If lots of people try to charge their vehicles around the same time (e.g. on returning home from work), public electricity suppliers may struggle to cope with the peaks in demand. So we are developing software for automatic energy management in local areas to balance demand with available supplies. This balancing act combines public supplies and locally produced reusable energy, using local storage as a buffer and staggering the times at which vehicles get charged.

Getting the financial incentives right — Electric motors may make the wheels go round, but money makes the world go round. So we are devising and testing business models that encourage use of electric vehicles and sharing of energy resources, allowing all those involved to cooperate in an economically viable way.

Showing how it works in practice — GreenCharge is testing all of these innovations in practical trials in Barcelona, Bremen and Oslo. Together, these trials cover a wide variety of factors: *vehicle type* (scooters, cars, buses), *ownership model* (private, shared individual use, public transport), *charging locations* (private residences, workplaces, public spaces, transport hubs), energy *management* (using solar power, load balancing at one charging station or within a neighbourhood, battery swapping), and *charging support* (booking, priority charging).

To help cities and municipalities make the transition to zero emission/sustainable mobility, the project is producing three main sets of results: (1) *innovative business models*; (2) *technological support;* and (3) *guidelines* for cost efficient and successful deployment and operation of charging infrastructure for Electric Vehicles (EVs).

The *innovative business models* are inspired by ideas from the sharing economy, meaning they will show how to use and share the excess capacity of private renewable energy sources (RES), private charging facilities and the batteries of parked EVs in ways that benefit all involved, financially and otherwise.

The *technological support* will coordinate the power demand of charging with other local demand and local RES, leveraging load flexibility and storage capacity of local stationary batteries and parked EVs. It will also provide user friendly charge planning, booking and billing services for EV users. This will reduce the need for grid investments, address range/charge anxiety and enable sharing of already existing charging facilities for EV fleets.

The guidelines will integrate the experience from the trials and simulations and provide advice on localisation of charging points, grid investment reductions, and policy and public communication measures for accelerating uptake of electromobility.

For more information

Project Coordinator: Joe Gorman, joe.gorman@sintef.no

Dissemination Manger: Arno Schoevaars, arno.schoevaars@pnoconsultants.com

Executive Summary

The GreenCharge project aims to demonstrate how technological solutions and associated business models can be integrated and deployed to overcome barriers in wide-scale adoption of EVs. The three pilot living labs play a central role in this demonstration. GreenCharge empowers cities and municipalities to make the transition to zero emission mobility with innovative business models, technologies and guidelines for cost-efficient and successful deployment and operation of charging infrastructure for EVs. To reach these goals, stakeholders throughout Europe need to be put to action. Their perspectives are crucial in fulfilling the transitioning to zero emission mobility.

To gain insight in stakeholders' perspective, a targeted study has been conducted on the GreenCharge value chain. The GreenCharge value chain consists of three 'primary value chains': Charging, Energy and EV. These primary value chains are supported by funding providers, knowledge providers, regulation providers, and other supporting roles. The stakeholder analysis enables GreenCharge to develop its platform in line with the opinions, needs and expertise of stakeholders in the value chains.

The stakeholder analysis shows that:

- Stakeholders are familiar with energy production and smart charging concepts. However, levels of expertise differ between stakeholder roles.
- Stakeholders have positive attitudes towards the transition to local renewable energy production and smart charging.
- Stakeholders in the primary value chains are concerned with multi-actor provision, charging infrastructure utilisation, effective use of local renewable energy sources, and charging infrastructure investment. Supporting roles are most concerned about charging accessibility, integration, and fairness.
- Stakeholders indicate knowledge providers as the organisation they most often collaborate with. Organisations in the Charging value chain are the least cooperative organisations.
- There are no obstructers in the transition towards the transition to zero emission/sustainable mobility. The supporting roles are regarded sceptic observers, whereas the Charging value chain stakeholders are enthusiastic observers. Stakeholders in the Energy and EV value chain are key enablers in the transition. The statement that there are no obstructers should be further explored during the project because there may be external factors or actors that could form a barrier in the transition.
- There are various projects and organisations in and around the primary value chains which share interest with GreenCharge.

All in all, different stakeholders require different approaches. Therefore, it is important to find the right way in which these stakeholders are engaged. With its communication, dissemination and exploitation, GreenCharge must aim to increase enthusiasm as well as create the feeling of empowerment amongst stakeholders.

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

Table of Contents

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

Table of Figures

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

List of Tables

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

List of Abbreviations

Table 1: List of abbreviations

Abbreviation	Explanation
EV	Electric Vehicle
LEV	Light Electric Vehicle
NGO	Non-governmental organisations
RES	Renewable Energy Source

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

List of Definitions

Table 2: List of definitions

Definition	Explanation
Multi-actor provision	E-roaming of booking and payment.
Primary stakeholders	Actors that are directly involved in the value chain.
Secondary stakeholders	Actors that are indirectly involved in the value chain e.g. by performing supporting, enabling or regulatory activities.
Stakeholder	An organisation which might be involved in or impacted by the GreenCharge project.
Tertiary stakeholders	Actors that do not have an involvement in the value chain, but (potentially) can become involved.
Value chain	Consists of all actors that are involved, both directly and indirectly, in performing activities that affect a product or service.
WHEESBEE	WHEESBEE is a Business Intelligence and Tech Mining tool aimed at supporting and stimulating the technological innovation processes of large enterprises, small and medium sized companies, and research centres.

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

1 About this Deliverable

1.1 Why would I want to read this deliverable?

This stakeholder analysis identifies the most important stakeholders within and around the GreenCharge value chain and assess their position towards the system in order to set up engagement strategies. Stakeholders have been invited to participate in a survey, which measures stakeholder characteristics such as interest, attitude, influence and knowledge. This survey is accompanied with a quantitative analysis on the most important stakeholders. This deliverable provides an overview of different stakeholder characteristics, stakeholder input and important relations between them. The reader can use this document to engage in understanding the world around the GreenCharge project from a business point-of-view.

1.2 Intended readership/users

Everyone with an interest in the GreenCharge project or EV (electric vehicle) charging, renewable energy, smart grids, smart neighbourhoods, smart mobility, smart cities or car-sharing in general might be interested in this deliverable. This deliverable is important as it provides insight in what other organisations think about the mentioned subjects. Interested readers may find organisations with similar missions or objectives, but might also find organisations with the same mind-set and opinions.

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

2 Introduction & objectives

The GreenCharge project aims to demonstrate how technological solutions and associated business models can be integrated and deployed to overcome barriers in wide-scale adoption of EVs. The three pilot living labs play a central role in this demonstration. Scenarios not tested in these living labs will be simulated. These endeavours require project and innovation management (Work Package 1), pilots in living labs (WP2), business model design and prototyping (WP3), enabling technology (WP4), the evaluation of innovation effects (WP5), a stakeholder acceptance evaluation (WP6), integrating eMobility in SUMPs (WP7), and the maximisation of impact (WP8). This report will present a stakeholder analysis which is part of WP3.

GreenCharge empowers cities and municipalities to make the transition to zero emission mobility with innovative business models, technologies and guidelines for cost-efficient and successful deployment and operation of charging infrastructure for EVs. To reach these goals, stakeholders throughout Europe need to be put to action. Their perspectives are crucial in fulfilling the transitioning to zero emission mobility.

2.1 Background

The rationale behind the stakeholder analysis is that innovation performed in broad interaction with stakeholders is more likely to lead to economically feasible and acceptable outcomes. The GreenCharge consortium consists of a broad range of partners with a complementary role allowing the exploitation and replication of the project results. It consists of a well-balanced set of, among others, governmental organisations, commercial companies and research organisations, each of which has a different stake and competence in the project. Once GreenCharge has succeeded in performing the pilots successfully, the next step will require:

- Further upscaling and improvements on how technological solutions and associated business models can be integrated and deployed to overcome barriers in wide-scale adoption of EVs,
- Finding partners within or outside of the consortium which are willing to fund investments required for scale-up and development towards a wider introduction,
- Broad engagement with stakeholders in order to pave the way for the social evolution into acceptance and the wide-scale adoption of EVs.

The stakeholder analysis will identify the most important stakeholders within and around the GreenCharge value chain and will assess their position (combination of stakeholders' characteristics such as interest, attitude, influence and knowledge) towards the project in order to set up engagement strategies. The stakeholders include: local, regional and national governments, roaming providers, manufacturers of EVs and their batteries, housing associations, real estate developers, charging infrastructure manufacturers and operators, (local) renewable energy suppliers, technology developers/providers, grid operators, local business, EV drivers and owners, etc.

The stakeholder analysis is based on publicly available information and aims to find a large number of stakeholders interested in how technological solutions and associated business models can be integrated and deployed to overcome barriers in the transition to zero emission mobility. Stakeholders will be invited to participate in an online survey which will be designed to measure stakeholder characteristics such as their interest, attitude, influence and knowledge. In addition, a quantitative analysis of the European projects around the GreenCharge value chain will be made.

The GreenCharge project might produce exploitable results for which the current consortium partners are not the optimal partners to further exploit and valorise them. Therefore, creating a network of partners around the consortium is key in maximizing exploitation opportunities for following up the project pilots and exploiting unforeseen project results.

2.2 Objectives

The main objective of the stakeholder analysis is to gather stakeholder information, which could be used to mobilise relevant stakeholders to support GreenCharge exploitation and dissemination objectives in Work

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

Package 8 (WP8). More effective stakeholder engagement strategies can be set up when stakeholders' viewpoint, their position and their opinion towards aspects of the transition to zero emission mobility are known. For exploitation purposes, a network of stakeholders and the results of the stakeholder analysis could be used to define:

- Common exploitation actions which benefit the entire consortium (e.g. Business model workshops with industry, Task 3.2 Business model design and workshops and Task 3.3 Business model prototyping, but also for the Communication Strategy and Plan and Dissemination and Exploitation Plan from Task 8.1).
- Individual exploitation action which benefit one or several of the GreenCharge partners (e.g. an interested end-user for new intellectual property (IP) generated in GreenCharge).

The stakeholder analysis can be used to develop more targeted dissemination strategies. If a stakeholder's position towards overcoming barriers in in the transition to zero emission mobility is known, the consortium is better able to address particular concerns, knowledge gaps and articulate the way it could collaborate with stakeholders. The stakeholder analysis might help in defining the optimal means of communication, for highly interested and committed stakeholders could be proactively involved in the GreenCharge project (e.g. in workshops or follow-up projects, uptake cities), whereas the less interested ones only need to be kept informed about it (e.g. through newsletter).

For this overall objective to be achieved, this report will explore stakeholder's interests and characteristics, and provide relevant recommendations for their effective management. Specifically, this report will answer the question:

What are the most important stakeholders within and around the GreenCharge value chain?

To answer the abovementioned question, this report will answer the following questions regarding the most important stakeholders:

- What *knowledge* do stakeholders have of the transition to zero emission mobility?
- Do stakeholders have a positive *attitude* towards GreenCharge and the technologies developed in GreenCharge?
- What are the main *concerns* and problems that stakeholders have regarding using the proposed system?
- How often does an organisation *collaborate* with organisations in the different phases of the Value Chain?
- What is the stakeholder's *influence* on the exploitation of GreenCharge results?
- Do stakeholders have a strategic *interest* in GreenCharge results and as such an interest in cooperation with the GreenCharge consortium if they are approached?

2.3 Methodology

This stakeholder analysis is based on two research steps:

1. A stakeholder survey[1] was conducted amongst 476 respondents to generate more in-depth information about the value chains. In total, 44 respondents had completed the whole survey and 17 of the respondents had completed the survey partially[2]. This survey contains questions on perspectives,

[1] More information on the stakeholder survey can be found in Appendix A (survey methodology) and C (full questionnaire)

[2] This indicates a response rate of >10%. For some questions, the partial responses were included, increasing individual question response rate up to 13%. These numbers are, although on the lower side, not unusual for a survey of this type and are therefore regarded satisfactory.

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

activity levels and concerns. This survey served two purposes. First, to map the playing field in terms of organisations' knowledge, attitudes, concerns. Second, to identify key collaborations and influencers. Care was put into balancing academic composition of the questions, specific stakeholder characteristics and input to the project, and user-friendliness.

2. By using the WHEESBEE tool[3], the stakeholder analysis focuses on the European organisations that have been working on projects on the topic of local renewable energy production or smart charging. Moreover, the number of projects over time and project partners were investigated. As such, the most active stakeholders in each part of the value chain were identified.

[3] More information on the WHEESBEE methodology can be found in Appendix B.

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

3 Stakeholders' perspective

Main findings

Knowledge: Stakeholders are familiar with the concepts around the transition to zero emission mobility. Expertise on Energy Smart Neighbourhoods is lacking behind.

Attitude: Stakeholders in this study display a positive attitude towards the transition to zero emission mobility.

Concerns: The three primary value chains (Charging, Energy, and EVs) show high levels of similarity in what stakeholders in the respective chains regard as most important concerns. 'Multi-actor provision', 'Charging infrastructure utilisation', 'Effective use of local RES', and 'Charging infrastructure investment' are all regarded as major concerns. The supporting functionalities report to be concerned about 'Charging accessibility', 'Integration', and 'Fairness'.

3.1 Introduction

Crucial parts in the transition to zero emission mobility are 'Local renewable energy production' and 'Smart charging EVs'. As such, this part of the report discusses: (1) the level of expertise stakeholders have on both topics, (2) what their attitudes regarding local renewable energy production and smart charging EVs are, and (3) stakeholders' major concerns. The analysis is based on the responses of 61 stakeholders. Respondents are based in 19 countries, of which 16 EU-Member States (including the UK). In total, the GreenCharge value chain was split up into 15 roles (see Figure 1).

The 15 roles are divided among four building blocks: (1) the Charging value chain, (2) the Energy value chain, (3) the EVs value chain, and (4) the supporting roles. The first three building blocks are referred to as the 'primary value chains'. Organisations within these primary value chains (role A-K in Figure 1) are referred to as 'primary stakeholders'. The primary value chains are portrayed as linear value chains. However, in some cases, jobs, products and information within a value chain can flow in a more iterative manner. At the final stage of each primary chain, the connection between value chain and end-user is established.

The Charging value chain is set in motion with the production of a charging facility by the 'Charging facility manufacturer'. After manufacturing, the charging facility is sold by the 'Charging facility retailer'. Once in place, the 'Charging facility operator' is in charge of the charging facility's functioning. The End-user interacts with the charging facility through the 'Charging services', such as booking, billing or roaming services.

Where the Charging value chain is triggered solely by the production of a charging facility, the Energy value chain starts with a combined effort of organisations active in 'Energy production', 'Energy distribution' and 'Energy storage'. These three roles create the input to the organisations in charge of 'Energy management'. It is this role that is connected to the End-user.

The EVs value chain is set in motion by production, similarly to the Charging value chain. Once the 'EV components' are manufactured, the 'Electric Vehicle' itself can be produced. These vehicles can be sold either directly to the End-user, or become part of a fleet. A 'Fleet operator' provides the means for an End-user to interact with and make use of a car in a fleet.

Similar to the three primary value chains, the supporting roles are directly connected to the End-user. But where the primary value chains interact in a linear way with other roles in their own value chain, the supporting roles interact with a large amount of roles scattered around the whole value chain. Supporting roles are not part of the industrial (e.g. EV component manufacturer) or service providing roles (e.g. Charging services) of the value chain and have their own place (separated from the linear part) and are therefore referred to as 'secondary stakeholders'.

The secondary stakeholders, such as local governments, play an important role in speeding up innovations in and acceptance of electric mobility. The supporting roles which provide funding interact with all roles in the value chain. In many cases, the primary value chain is (partially) funded by external partners at the beginning

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

of a transition (e.g. transition to electric mobility). In this phase of the transition it is not possible yet to make enough money out of the business itself, so it is needed to attract other kinds of funding for making this transition possible. These funding partners are also of importance for research institutes (e.g. universities). Organizations such as (local) authorities or banks can act as funding partners (e.g. sustainability or research grants).

Research institutes are the organisations which provide the knowledge needed for making a transition possible. They can provide information about technical or functional innovations because of their large scientific network. Knowledge providers are also important for evaluating pilot studies and do interact with almost every role in the GreenCharge value chain.

Authorities are responsible for providing regulations. This is the role where local authorities which responded to the survey placed themselves and can be seen as the main role of the authorities in the transition to zero-emission mobility. They can facilitate other partners through providing regulation which is adapted to the (upcoming) mobility transition. Regulation providers do interact with industry parts of the value chain, as well as with the end-users of the GreenCharge value chain.

Concluding, four building blocks make up the GreenCharge value chain. Within these building blocks, 15 different roles are identified. During this study, stakeholders in 14 of the total 15 roles are analysed. A 'Charging facility retailer' was not included in this study.

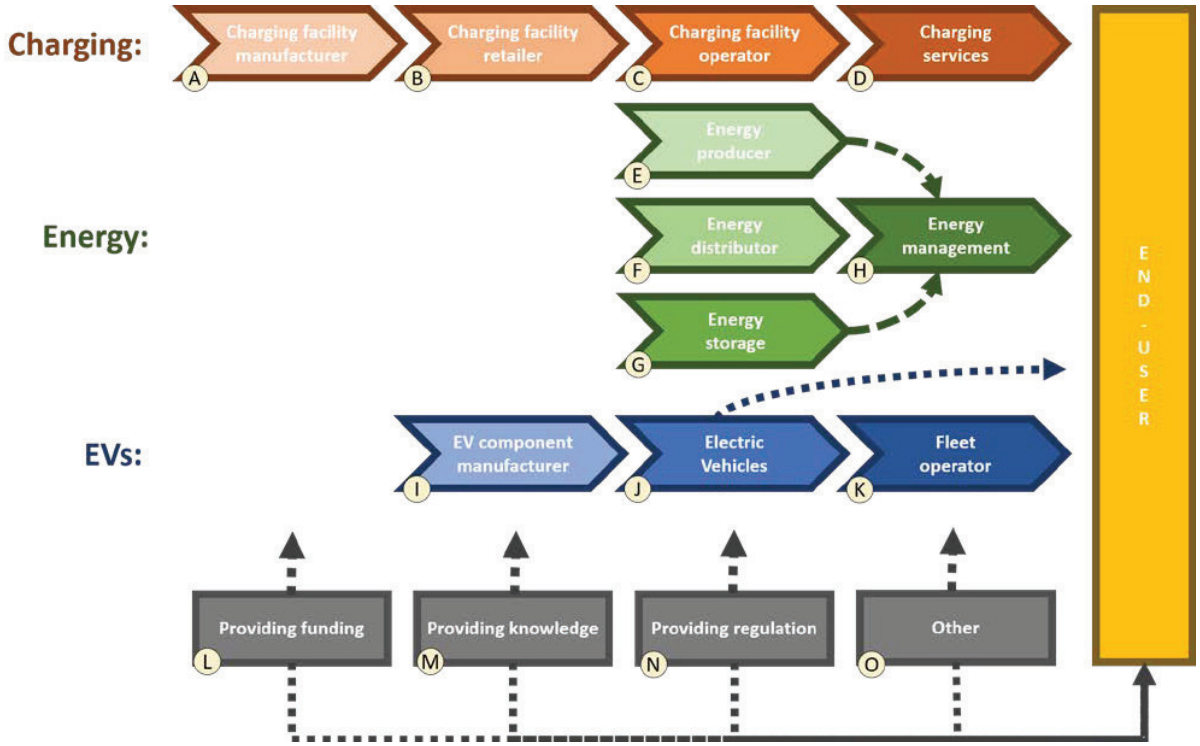
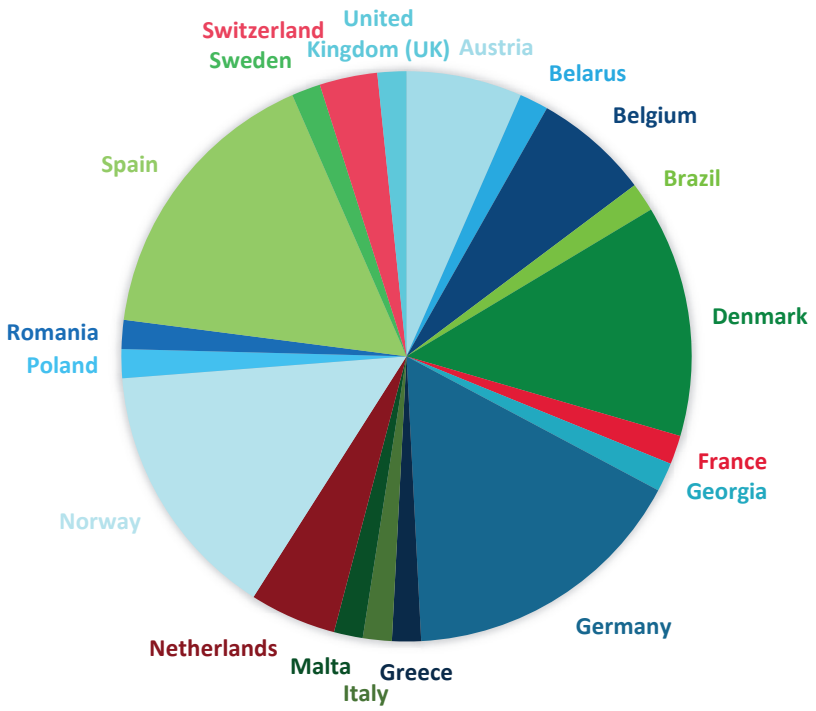


Figure 1: Value chain characterization

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.



Country	#
Austria	4
Belarus	1
Belgium	4
Brazil	1
Denmark	8
France	1
Georgia	1
Germany	10
Greece	1
Italy	1
Malta	1
Netherlands	3
Norway	9
Poland	1
Romania	1
Spain	10
Sweden	1
Switzerland	2
United Kingdom	1

Figure 2: Geographical spread of respondents

Figure 2 and its corresponding legend shows that most respondents are from Spain (10), Germany (10), Norway (9) or Denmark (8). The dominance of the first three is explained by the fact that these three countries are also the pilot site countries. Stakeholders that have a connection to one of these pilot sites might have felt more intrinsic motivation to complete the survey than others. The presence of Denmark is less easy to explain, as is the Brazilian response. All in all, the respondents originated from 19 countries, even though some countries are overrepresented, the respondent base is well-spread. Respondents from various parts of Europe have participated in the survey, all with their own vision, beliefs and interests.

3.2 Knowledge on local renewable energy production and smart charging

Despite the increasing popularity of sustainable mobility and green energy, one cannot assume that the topics of local renewable energy production and smart charging are common knowledge. Therefore, this study tries to gain insight into the level of expertise on these topics as well as other related topics. Stakeholders are asked for a self-assessment of their level of knowledge on the various topics around the GreenCharge value chain. These topics were rated on a scale of 1 to 5, where 1 corresponds to "no level" of expertise, and 5 to "high level" of expertise.

Table 3: Survey respondents: Knowledge

Type of stakeholder	**Number of respondents**
Energy value chain	8
Charging value chain	7
EVs value chain	8
Funding providers	8
Regulation providers	4
Knowledge providers	7
Others	5

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

Total	47

As to be seen in Table 3, in total 47 respondents completed this question. Of those 47, eight are part of the Energy value chain, seven of the Charging value chain and eight of the EVs value chain. Moreover, eight respondents were funding providers, and four were regulation providers. Finally, seven knowledge providers answered this question. This entails that five respondents fulfil another role.

Figure 3 displays the knowledge in each value chain regarding the subjects of smart charging and Energy production, storage and distribution. Smart charging relates to knowledge regarding charging facilities, booking services, EV-sharing, billing services, and the relation towards SUMPs. To measure the level of expertise on Energy production, storage and distribution; local renewable energy production, energy storage, Smart Energy Management, energy grids and Energy Smart Neighbourhoods are taken into consideration.

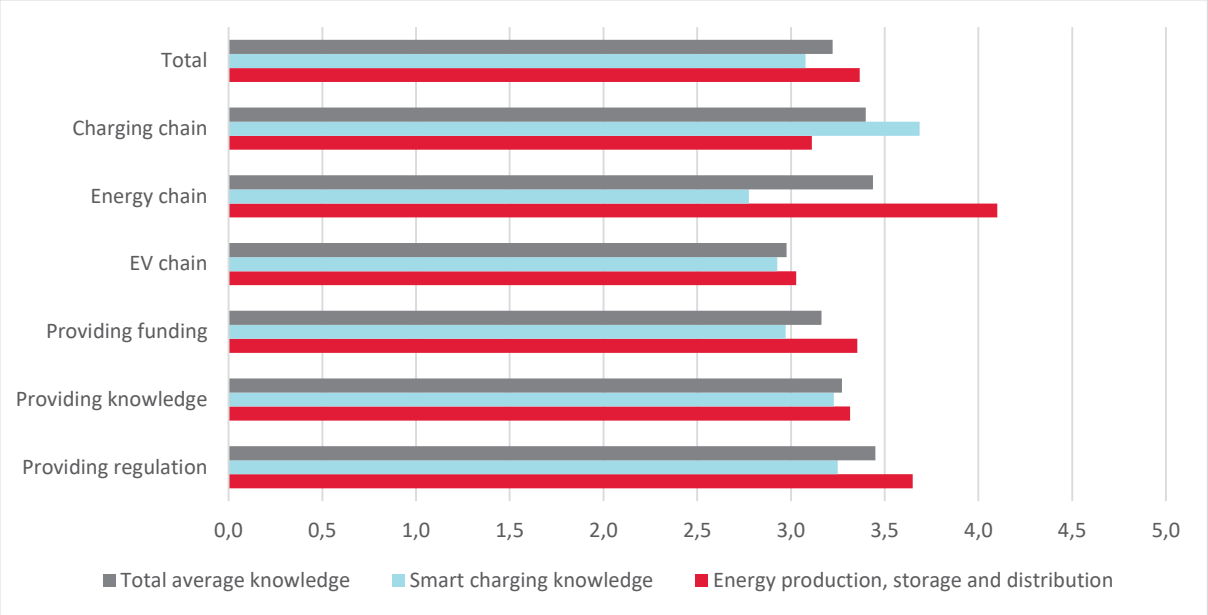


Figure 3: Knowledge per value chain

The average level of expertise is highest among the Regulation providers (3.5) and in the Energy and Charging value chain, both scoring 3.4. Stakeholders in the EVs value chain report the lowest average knowledge, scoring 3.0. The Charging and Energy value chains score best in their own field. The Charging value chain scores highest on 'Smart charging knowledge' and the Energy value chain is the highest ranked regarding expertise on 'Energy production, storage and distribution'. Average knowledge levels in the EV chain do not differ much when comparing the two topics. The discrepancy in level of expertise between the two types of knowledge is biggest within the Energy chain (1.3 points).

The knowledge providers report having a balanced knowledge base on both subjects, with a score of 3.2 for Smart charging knowledge, and 3.3 for Energy production, storage and distribution. The funding providers and regulatory offices display a higher level of expertise in energy-related subjects (3.4) compared to Smart charging subjects (3.0). Regulation providers report a score of 3.3 and a 3.7 on the Smart charging and Energy items, respectively.

Looking into the various aspects that makeup the scores of Smart charging and Energy production, storage and distribution, analysis shows that Charging billing services (2.6), Charging booking services (2.7), and Energy Smart Neighbourhoods (2.8) are the subjects stakeholders have the lowest knowledge level of. Moreover, stakeholders report an average level of expertise of 3.0 on Car-sharing. Charging facilities (3.8), Smart Energy

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

Management (3.6), Energy grids (3.5) and Energy storage (3.5) are the areas in which the stakeholders in this survey have the most expertise.

3.2.1 Conclusion

Regular Energy management knowledge is present throughout the GreenCharge value chain. However, to ensure scaling up the GreenCharge system is possible, power must be regulated in the most efficient way. As such, expanding the 'Energy Smart Neighbourhoods' knowledge base is necessary. There is still room for increasing the Car-sharing knowledge base. This increase could boost the transition to zero-emission mobility. The above average knowledge level of the regulation providers can support in further scale up, such as to uptake cities. These uptake cities can inspire other cities to successfully transition to zero-emission mobility. Finally, the services that enable billing and booking of charging require more in-depth research to increase knowledge levels.

3.3 Attitude

As described in the previous section, the concepts of Smart charging and Energy production, storage and distribution are reasonably known throughout the GreenCharge value chain. In this section, the stakeholders' attitude towards local renewable energy production and the smart charging of EVs is reported. It could be stated that just having a positive stance towards overcoming barriers in transitioning to zero emission mobility does not describe one's attitude (Fishbein, 1979; Sheppard, Hartwick & Warshaw 1988). Having a positive stance towards overcoming these barriers in combination with actively looking to overcome barriers in wide-scale adoption of EVs, does. This behavioural component of attitude is essential (Madden, Ellen & Ajzen, 1992; Montano & Kasprzyk, 2015; Otieno, Liyala & Odongo, 2016).

Table 4: Survey respondents: Attitude

Type of stakeholder	**Number of respondents**
Energy value chain	8
Charging value chain	8
EVs value chain	8
Funding providers	8
Regulation providers	4
Knowledge providers	7
Others	6
Total	**49**

As to be seen in Table 4, the attitude part of the survey was answered by 49 respondents. For primary value chains, eight respondents were part of this 49. Likewise, funding providers were represented by eight respondents. Seven knowledge providers answered this question, as did four regulation providers. Respondents were submitted to a semantic differential question to directly measure their attitude towards both local renewable energy production and smart charging EVs.

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

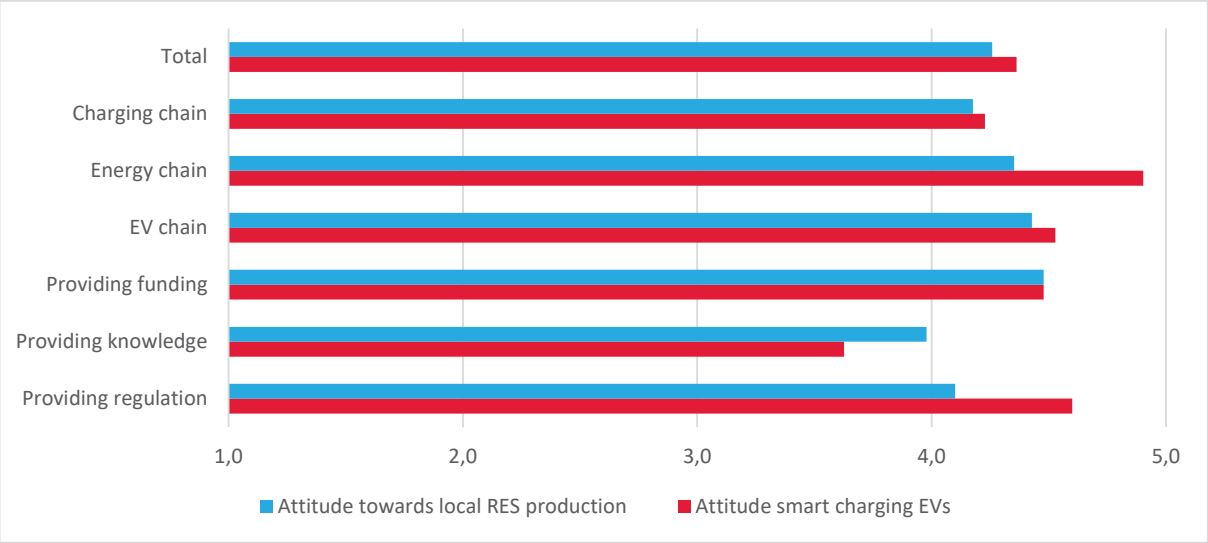


Figure 4: Attitudes towards local renewable energy production and smart charging EVs

According to Figure 4, the average attitudes towards local renewable energy production and smart charging EVs (4.3 and 4.4, respectively). The knowledge providing institutions are the least positive of all stakeholders, scoring 3.6 on attitude towards smart charging EVs, and 4.0 on attitude towards local renewable energy production. With these scores, they are the lowest scoring stakeholder group on both items. However, all types of stakeholders report a positive attitude towards both local renewable energy production and Smart charging EVs. The stakeholders in the Energy value chain (4.4 and 4.9, respectively) score above average, and report the most positive attitudes. The Charging and EVs value chain and funding providers report similar attitude levels. Regulatory offices report a very positive attitude towards both as well. They are the most positive towards smart charging EVs (4.6) in comparison to local renewable energy production (4.1). Analysis of the individual question items regarding local renewable energy production shows that the 'economic viability' is where stakeholders have the least positive attitude towards (3.5 – 4.3, averaging 3.8). More positive attitudes are shown towards the other four items – 'desirability', 'necessity, 'importance', 'appeal'.

3.3.1 Conclusion

In the end, it can be concluded that there is a positive attitude towards the transition to local renewable energy production and smart charging EVs amongst stakeholders throughout the entire GreenCharge value chain. The focus in the local renewable energy production solution should be on realising and explaining economic viability, for the least positive attitudes are displayed towards this topic. Given the fact that the score of this item is still relatively high, this is not in the first place a concern. However, stakeholders might have concerns in the transition to zero emission mobility. These concerns are dealt with in the next section.

3.4 Concerns

The previous section demonstrated that stakeholders involved in this study display a positive attitude towards local renewable energy production and smart charging EVs. To identify concerns regarding these topics, respondents were asked to indicate to what extent a certain aspect was regarded as a concern. These aspects have been pre-identified in the early stages of GreenCharge project and are regarded as paramount issues in both pilot and simulation. Respondents were asked to rate the degree of concern on a scale from 1 to 5, where 1 corresponds to 'no concern' and 5 to 'high concern'.

Table 5: Survey respondents: Concerns

Type of stakeholder	**Number of respondents**
Energy value chain	6
Charging value chain	7

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

EVs value chain	8
Funding providers	8
Regulation providers	4
Knowledge providers	7
Others	4
Total	**44**

As to be seen in Table 5, 44 respondents have taken part in answering this question. Six respondents belong to the Charging value chain, seven to the Energy value chain, and eight from the EVs value chain. In addition, eight funding providers and seven knowledge providers responded. Finally, four regulation providers have provided input on this matter.

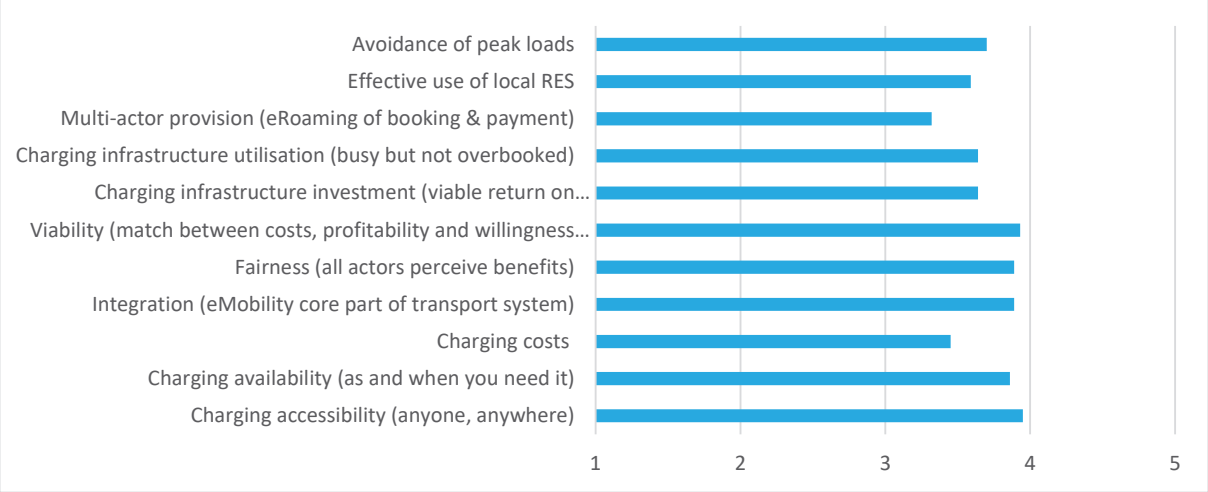


Figure 5: Average concerns

Figure 5 displays the overall concerns of all value chains. The top five concerns are 'Charging accessibility' (4.0), 'Viability' (3.9), 'Integration' (3.9), 'Fairness' (3.9), and 'Charging availability' (3.9). All concerns were confirmed to be concerns by stakeholders. To identify the most important concerns the number of stakeholders that responded with 'moderately high concern' or 'high concern' is measured. This analysis is performed for each value chain. In addition to the concerns displayed in Figure 5, other mentioned concerns are 'Autonomous vehicles', 'Electric network stability and reliability', and 'the development of fair markets with high public acceptance'.

3.4.1 Total

To indicate the important concerns, Figure 6 displays the percentage of stakeholders that responded with 'moderately high concern' or 'high concern'. This same identification (i.e. 'important concern') is used in sections 3.4.2, 3.4.3, 3.4.4, 3.4.5, 3.4.6, and 3.4.7. Figure 6 displays the top five barriers of all stakeholders. 'Viability', 'Charging accessibility', 'Integration', 'Fairness' and 'Charging availability' are regarded the top five major concerns. In the next six paragraphs, the top five for each value chain or supporting role is analysed to more extent.

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

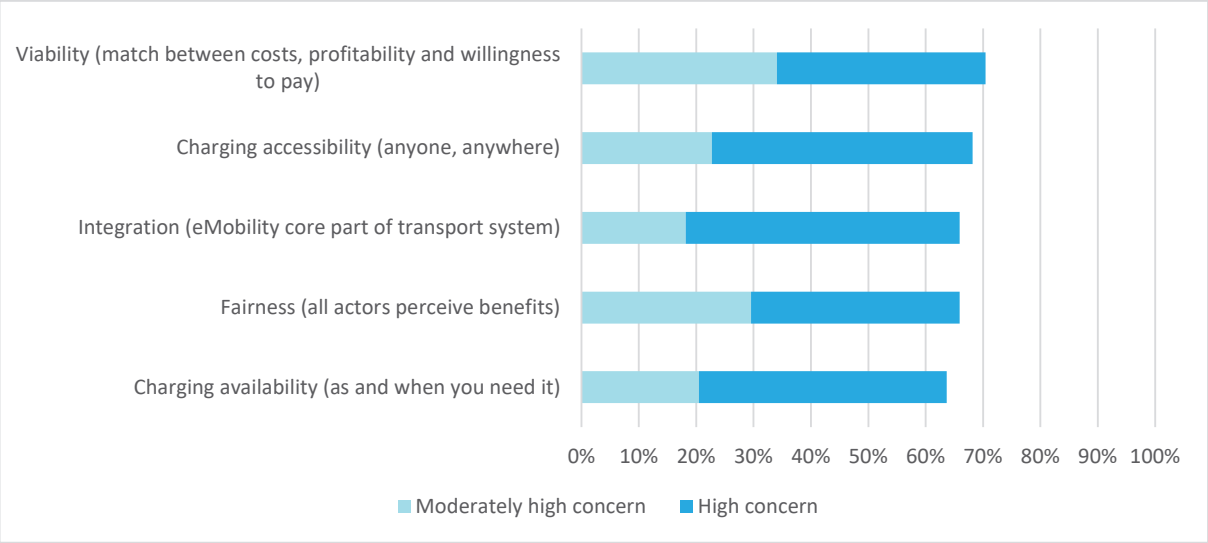


Figure 6: Concerns throughout GreenCharge value chain

3.4.2 Charging value chain

Figure 7 illustrates the top five barriers identified by the Charging value chain. The biggest concerns are 'Multi-actor provision' and 'Charging infrastructure utilisation'. Multi-actor provision refers to the e-roaming of booking and payment. This entails a user can use one card, app or other device to charge at different charging service providers. All stakeholders in this survey identify these two as an important concern. 'Charging accessibility' and 'Effective use of local RES' are ranked third, with 83% of the respondents indicating these as an important concern. Two third of the respondents in the Charging value chain regard 'Charging infrastructure investment' as an important concern.

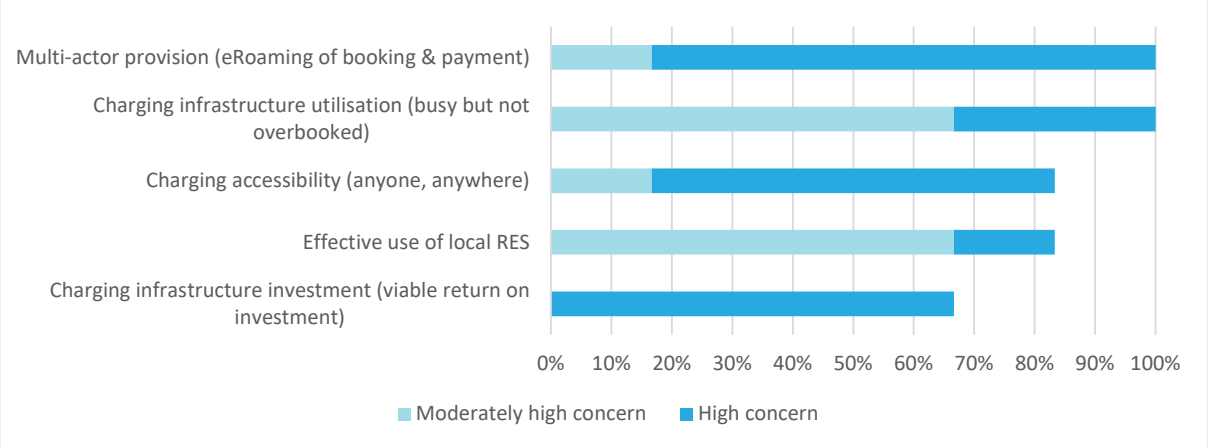


Figure 7: Concerns in Charging value chain

3.4.3 Energy value chain

The scores of concerns in the Energy value chain are all relatively close. Figure 8 displays the top five concerns in this chain. All stakeholders in this chain regard 'Avoidance of peak loads', 'Effective use of local RES', 'Multi-actor provision' and 'Charging infrastructure utilisation' as important concerns. 'Charging infrastructure investment' is fifth in this ranking, with 86% of the respondents classifying it as an important concern. There is a similarity with the Charging value chain, where 'Multi-actor provision', 'Charging infrastructure utilisation', and 'Effective use of local RES' are regarded as major concerns as well. In total, four out five concerns are the same when comparing the Energy to the Charging value chain.

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

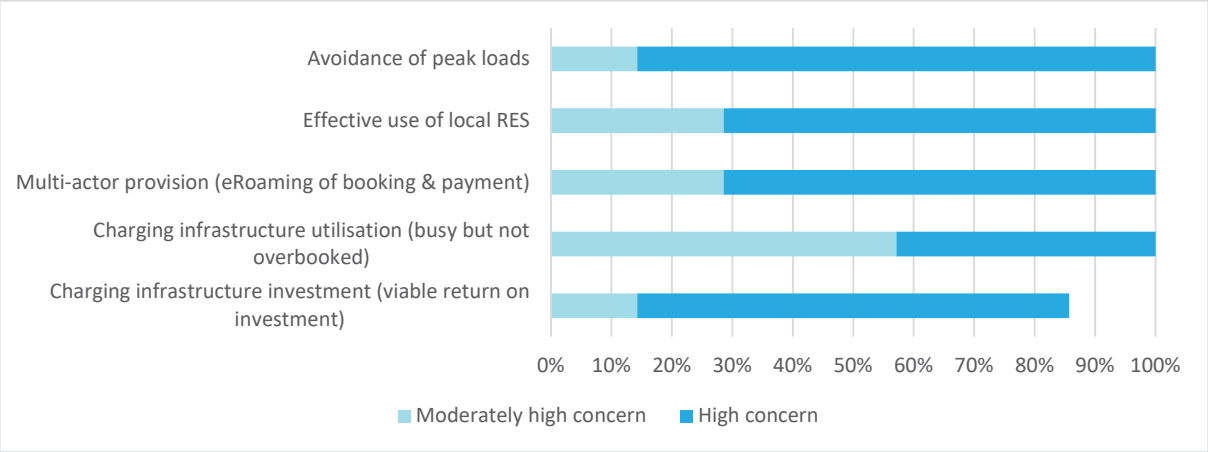


Figure 8: Concerns in the Energy value chain

3.4.4 EVs value chain

In the EVs value chain, one major concern stands out: the 'Avoidance of peak loads'. All stakeholders identified this as an important concern. The following four: 'Effective use of local RES', 'Multi-actor provision', 'Charging infrastructure utilisation', 'Charging infrastructure investment' are regarded as important concerns by 63% of the stakeholders in this study. Again, 'Multi-actor provision' and 'Charging infrastructure utilisation' are among the list of concerns. The EVs value chain has the same top four as the Charging value chain, and has the exact same five major concerns as the Energy value chain, but in a different order. The top five for the EVs value chain is presented in Figure 9.

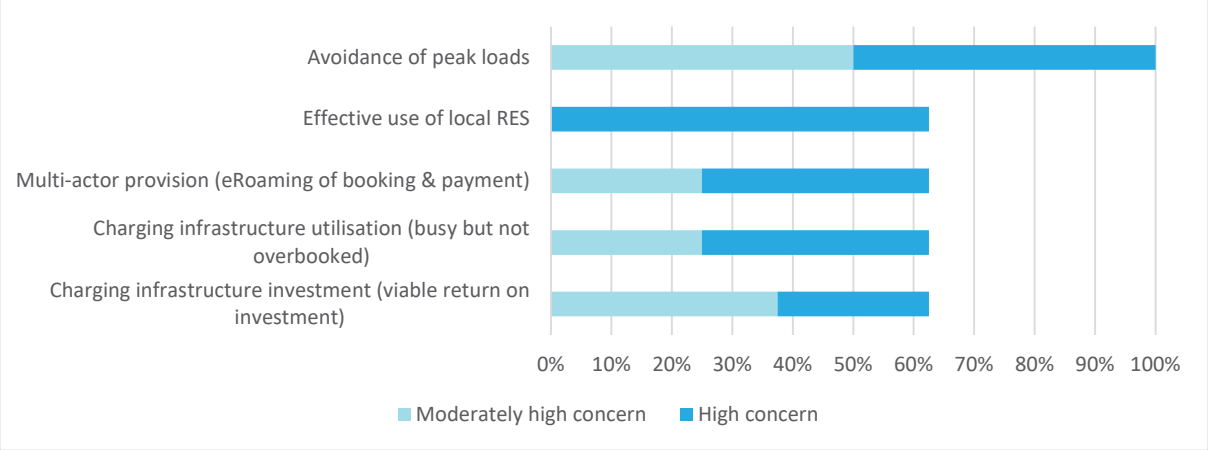


Figure 9: Concerns in the EVs value chain

3.4.5 Providing funding

The funding providing organisations have concerns different than the previous three value chains. The effective use of local renewable energy sources is a reoccurring issue. In this case 50% of the respondents regarding it as an important concern. Funding providers display the highest level of concern for 'Integration' (63%). Finally, 'Viability', 'Fairness' and 'Charging accessibility' are the bottom three in this top five, with 50% of the stakeholders that provide funding reporting them as important concerns. The results are displayed in Figure 10.

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

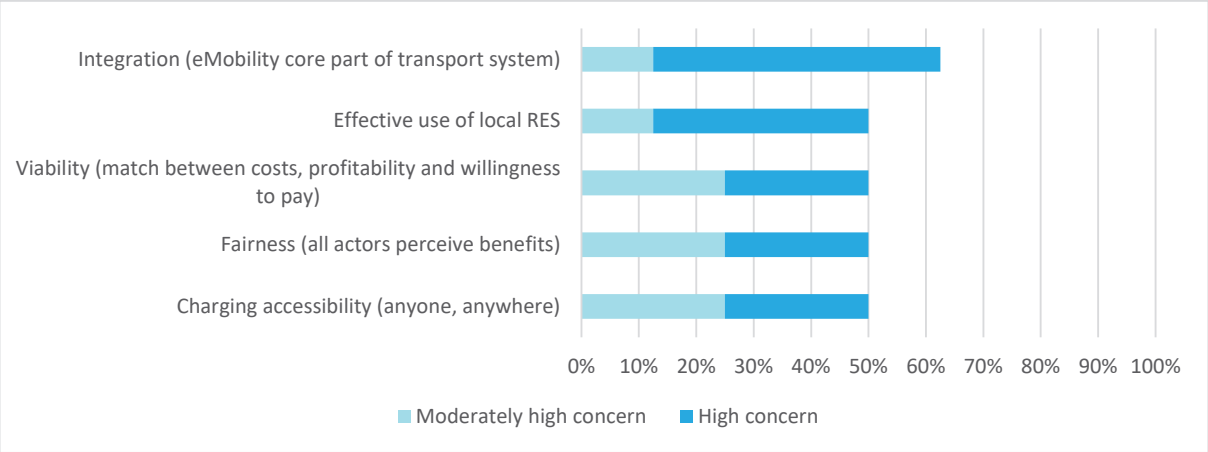


Figure 10: Concerns for funding providers

3.4.6 Providing knowledge

The knowledge providing role also differs greatly from the primary value chains. The top five is presented in Figure 11. Most important for those organisations that work in providing knowledge are: 'Charging accessibility', 'Integration', 'Fairness', and 'Charging costs'. These four topics are regarded as important concerns by 71% of the stakeholders providing knowledge. Following in fifth place is 'Charging availability' with a score of 57%. With the selection of these top five concerns, the knowledge providers share three out of five selections with the funding providers, namely 'Charging accessibility', 'Integration', and 'Fairness'.

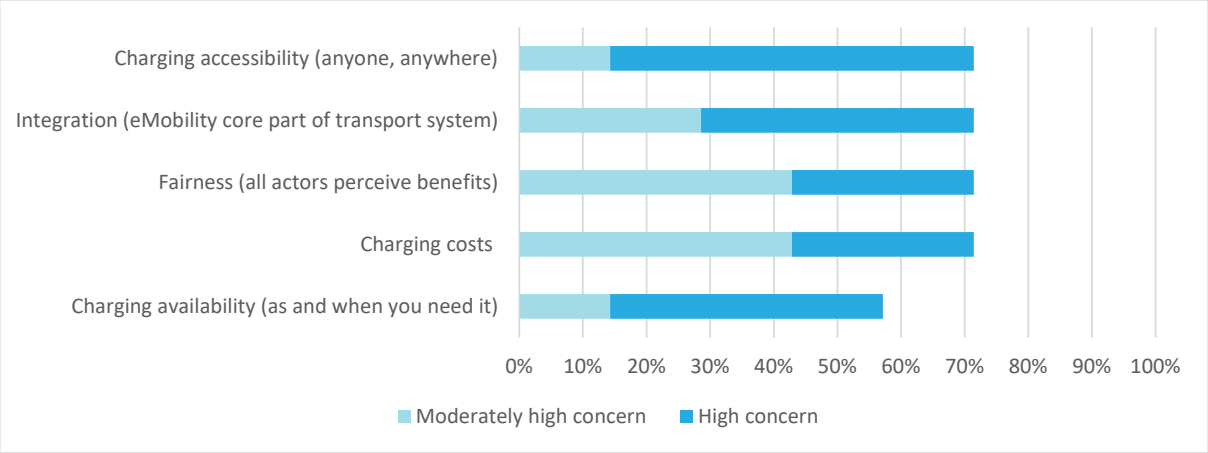


Figure 11: Concerns for knowledge providers

3.4.7 Providing regulation

The top five of concerns in the group of local governments and other regulation providers shows great similarity with the two other supporting roles. Regulation providers share four out of five major concerns with funding providers, and three out of five with knowledge providers. 'Fairness' and the 'Effective use of local RES' are most important to this stakeholder group (100%). The 'Avoidance of peak loads', 'Integration', and 'Charging accessibility' share third place, with 75% of stakeholders in the regulatory stakeholder group indicating them as major concerns. These findings are depicted in Figure 12.

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

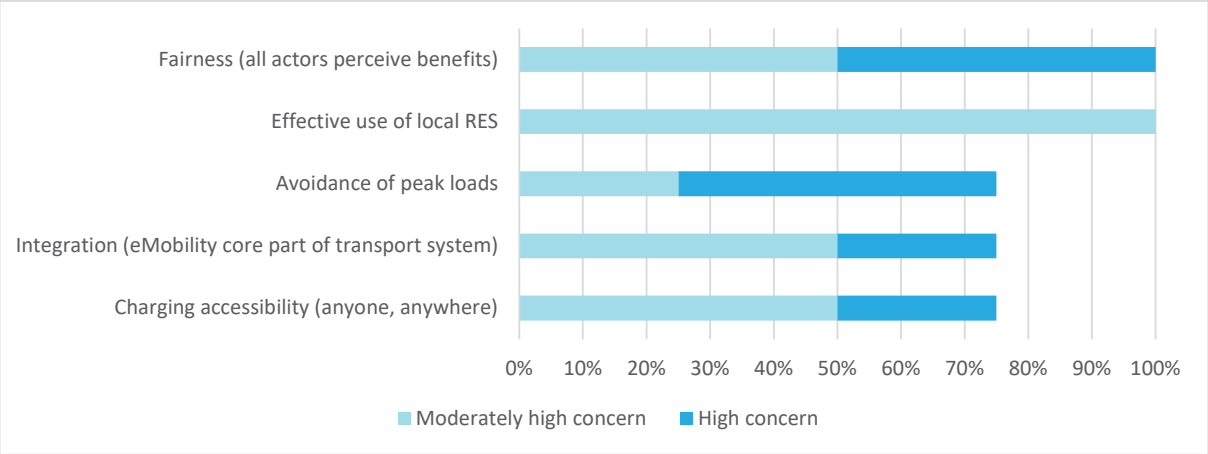


Figure 12: Concerns for regulation providers

3.4.8 Conclusion

When considering communicating with or disseminating information to stakeholders, the stakeholders in the three primary value chains (Charging, Energy, EV) display similar concerns. 'Multi-actor provision', 'Charging infrastructure utilisation', 'Effective use of local RES', and 'Charging infrastructure investment' should be central in the communication about the concerns towards these value chains. 'Charging accessibility' is what the Charging value chain stakeholders are most concerned about, where the Energy and EVs value chain stakeholders benefit from dealing with the concerns of the 'Avoidance of peak loads'.

When disseminating to stakeholders outside these three primary value chains, all supporting roles have concerns regarding 'Charging accessibility', 'Integration', and 'Fairness'. In addition, regulation and funding providers care about 'Effective use of local RES'. Finally, the funding providers are specifically concerned about 'Viability', and knowledge providers are concerned about 'Charging costs', and regulation providers about 'Avoidance of peak loads'.

Of course, the main concerns mentioned by stakeholders are not the only concerns that need to be addressed while communicating or disseminating information. It can also be important to share information about other topics such as charging costs or multi-actor provision. A complete set of information can help to influence the thoughts, minds and actions of stakeholders. In some cases it is valuable to help them understand they would benefit from integrating their thinking within a wider context, instead of being focussed on their main concerns.

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

4 Stakeholders' input

Main findings:

Collaboration: Stakeholders indicate that their collaborations with knowledge providers are the strongest collaborations they have. The collaboration flowing from funding providers to the knowledge providers is the strongest collaboration. The least cooperative organisations are those in the Charging value chain. The collaborative relationship between regulation providers and the Charging value chain is the poorest.

Impact: Stakeholders active in the Energy and EV value chain have the potential to influence the GreenCharge value chain. Moreover, these stakeholders are also very willing to try and induce change. This willingness is also visible amongst those providing funding and knowledge. However, stakeholders in these roles have less potential to influence the value chain.

Innovation: Stakeholders in the Energy and EV value chain are the key enablers for the transition to zero emission mobility. The Charging value chain will potentially fulfil a supportive role in the transition, where the stakeholders in the supporting roles will likely act as sceptic observers.

4.1 Introduction

This chapter identifies the main stakeholders in the GreenCharge value chain based on stakeholders' input. The concept of main stakeholder is defined in three different ways: (1) key collaborations, (2) most influential actors, and (3) most innovative stakeholder. The analysis is based on the responses of 61 stakeholders. Respondents are based in 18 European countries, of which 16 EU-Member States (including the UK).

4.2 Key collaborations

To map the degree and direction of collaboration between each of the primary value chains and the supporting roles, stakeholders were asked to indicate the frequency of collaboration on a scale of 1 to 5. In this case, 1 corresponds to 'never' and 5 to 'very often'. Again, the categorization as described in Figure 1 in Chapter 3.1 has been used. This entails dividing stakeholders into the primary value chains: Charging, EV and Energy. Accompanying the primary value chains are the supporting functions: providing funding, providing regulation, and providing funding. The data was converted into a chord diagram, displayed in Figure 13 below. Collaborations within a value chain or role have been omitted from the figure, for this analysis focuses on collaboration between different value chains and roles.

Table 6: Survey respondents: Key collaborations

Type of stakeholder	**Number of respondents**
Energy value chain	8
Charging value chain	7
EVs value chain	8
Funding providers	8
Regulation providers	4
Knowledge providers	7
Others	5
Total	**47**

Table 6 shows that in total 47 respondents completed this part of the survey. Of those 47, eight are part of the Energy value chain, seven of the Charging value chain and eight of the EVs value chain. Moreover, eight respondents were funding providers, and four were regulation providers. Finally, seven knowledge providers answered this question. As such, that five respondents fulfil another role.

The frequency of collaboration reported by stakeholders themselves is visualized by the outer bars in Figure 13. The wider the outer bar, the higher the cumulative level of cooperation as indicated by stakeholders

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

themselves. The width of the flows stemming from the outer bars represent the frequency of collaborations as reported by the organisation corresponding to the outer bar. The wider the flow at the stem, the higher level of frequency of collaboration with the value chain type at the other side of the flow according to the stakeholders at the stem. Therefore, if the stem originating at A flowing to B is very wide, then A reports a high frequency of collaboration with type B organisations. With this perspective in mind, Figure 13 shows that stakeholders collaborate on a regular basis.

The colour of the flow from one outer bar to the other is determined by the 'most dominant collaborator'. If organisation A indicates it collaborates more often with organisation B than organisation B indicates it does with A, organisation B is regarded the dominant collaborator. As a result, the flow between A and B will have the same colour as the outer bar linked to organisation B. Therefore, if an outer bar is connected to a lot of different colours, other organisations view this type of organisation as less of a key collaborative partner than the other way around. Put differently: if an out bar is connected to many different colours, the stakeholder group linked to this outer bar tend to overestimate their own collaborative behaviour. A disadvantage of this way of displaying the flows is that even when sizes at both ends are similar, and collaboration was assessed almost in balance, there is always a 'dominant' collaborator. The flow will always have the same colour as the dominant collaborator's outer bar.

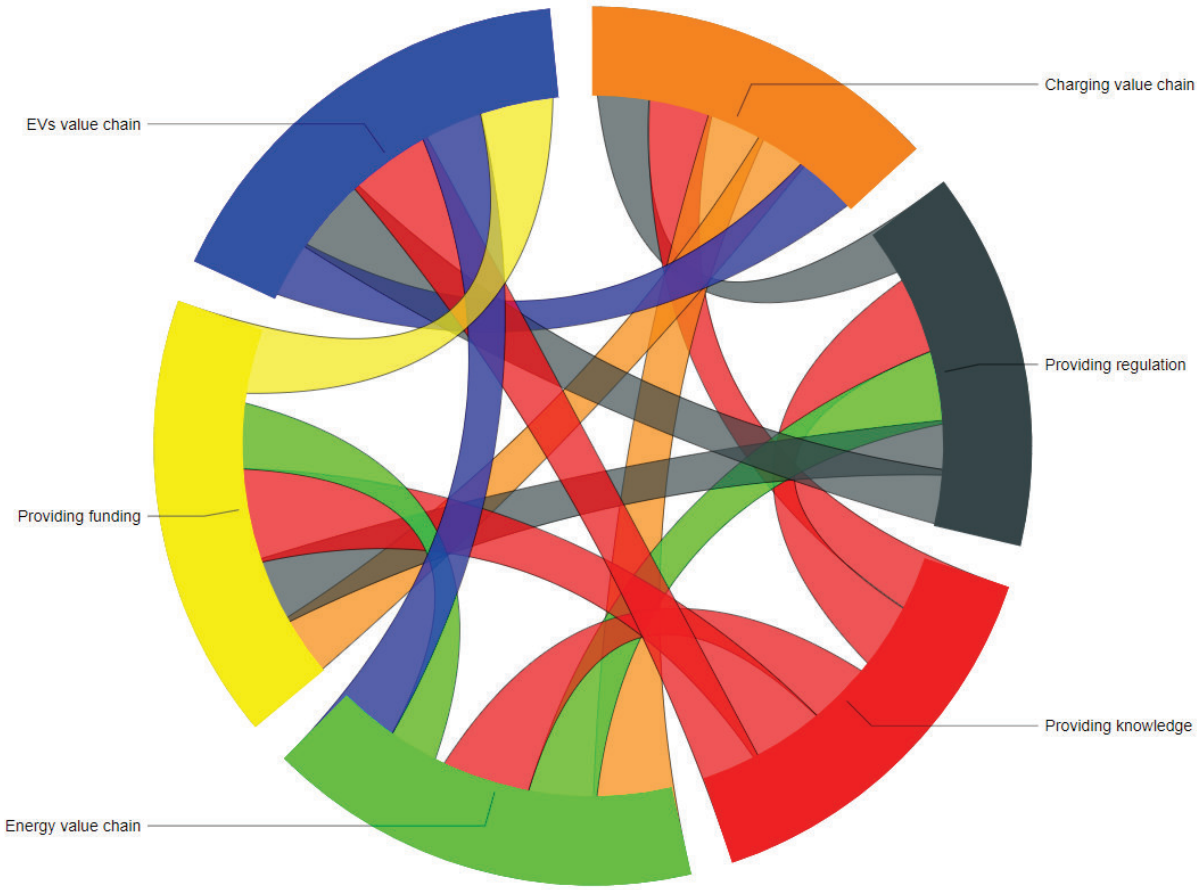


Figure 13: Chord diagram of collaboration

The strongest mutual collaborations are Providing funding and Providing knowledge, and Energy value chain and Providing knowledge as indicated by the red flow between these stakeholder groups. The presence of Providing knowledge in both of the strongest mutual collaborations may point to the fact that Providing knowledge are regarded key collaborators in the GreenCharge value chain. The Charging value chain stakeholders report the lowest frequency of collaboration (3.0). According to stakeholders' self-report, the

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

Energy value chain (3.7), the EVs value chain (3.8), and those Providing funding (3.9) collaborate most often. The least collaboration takes place between regulation providers and the Charging value chain, as indicated by the narrow grey flow between these stakeholder groups.

Comparing the frequency of collaboration reported by stakeholders themselves and the frequency reported by other stakeholders shows that the EVs value chain and funding providers tend to overestimate the frequency of collaboration throughout the GreenCharge value chain. This is indicated by the difference in colours connected to this outer bar. The greatest discrepancies are found in the self-reporting and external reporting of the collaboration between the EVs value chain and the knowledge providers (1.5), as well as the EVs value chain and the regulation providers (1.4).

Knowledge providers tend to underestimate their frequency of collaborations, as indicated by the overwhelming dominance of the colour red in Figure 13. Organisations providing knowledge report the second but lowest level of collaboration (3.3). However, external reports show the complete opposite, for knowledge providers are most often selected as partner for collaboration by other stakeholders (4.3). The Charging value chain is the least favourite collaboration partner (3.1). This is in line with self-reporting in this value chain (3.0). The tabulated results are displayed in Table 7.

Table 7: Collaboration frequencies

From \ *To*	*Charging value chain*	*Energy value chain*	*EVs value chain*	*Providing funding*	*Providing knowledge*	*Providing regulation*
Charging value chain	-	3.0	3.2	2.7	3.3	2.7
Energy value chain	4.1	-	3.3	2.6	4.6	3.5
EVs value chain	3.0	3.2	-	3.9	4.5	4.1
Providing funding	3.2	3.4	3.6	-	4.9	3.5
Providing knowledge	3.0	3.3	3.0	3.9	-	3.4
Providing regulation	2.5	3.8	2.8	2.8	4.0	-

Collaboration between regulation providers and the Charging value chain happens least often (2.7 and 2.5). Regulation providers also report low scores regarding collaboration with the EVs value chain (2.8) and the Providing funding role (2.8). However, the external assessment of this collaboration is quite high (4.1 and 3.5, respectively). Moreover, the frequency of collaborations reported by the Charging value chain with respect to the funding providers is relatively low (2.7). Finally, the Energy value chain reports low levels collaborations with funding providers (2.6), whereas the other way around high scores are reported (3.6). The largest discrepancy is found in the self-assessment and external assessment of collaboration of knowledge providers and the EVs value chain (1.5).

4.2.1 Conclusion

In summary, stakeholders in this study indicate knowledge providers as the organisation they most often collaborate with. The collaboration between funding providers and knowledge providers is the most frequent collaboration. The least cooperative organisations are those in the Charging value chain. These organisations are also the least favourite partners to cooperate with, according to other stakeholders. The collaborative

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

relationship between regulation providers and the Charging value chain is the poorest. The collaboration between regulation provider and the Charging value chain is important. After all, the regulators set the stage for establishing reliable charging networks. These lesser developed collaborations constitute key areas for improvement. End-users of the GreenCharge system will interact with all types of stakeholders, either directly or indirectly. Therefore, collaborations are a way of managing the barriers to zero emission mobility. On the other hand, the key collaborations are already a steady base on which innovative developments may take place.

4.3 Influential actors

In the transition to zero emission mobility, it is important to identify the (types of) stakeholders that are likely to play a major role in this transition. Therefore, two analyses were made: (1) an analysis of the stakeholders' influence on the status quo, and (2) an analysis of the stakeholders' position towards the potential effects of the transition. The status quo analysis is based on stakeholders' influence and their willingness to exert that influence. Both aspects are rated based on a scale of 1 to 5. For influence, respondents are asked to which extent they agree to a statement (e.g. "my organisation has a large market share"), where 1 corresponds to 'strongly disagree' and 5 to 'strongly agree'. Willingness to exert influence is defined by how often stakeholders take part in activities such as dialogues with other organisations or collaborative research projects with other organisations. In this case, 1 equals 'never' and 5 equals 'very often'.

To analyse stakeholders' position towards the transitions, on one hand, the embeddedness of local renewable energy production and smart charging and the perceived change on their organisation is taken into consideration. On the other hand, stakeholders' interest is compared to their influence.

Table 8: Survey respondents: Influential actors

Type of stakeholder	**Number of respondents**
Energy value chain	7
Charging value chain	7
EVs value chain	7
Funding providers	8
Regulation providers	4
Knowledge providers	8
Others	2
Total	**43**

Table 8 shows that of the 43 respondents that have reported on this subject, seven belong to the Charging value chain. The Energy value chain, EVs value chain, funding and knowledge providers were represented by eight respondents each. Finally, four regulation providers have considered and answered question regarding their influence. In section 4.3.2, one more Charging value chain actor and one organization active in the EVs value chain took part in this survey.

4.3.1 Position in status quo

To gain insight in the current situation in the value chain, stakeholders' influence and their willingness to exert it is analysed. Influence is defined as "the ability of a stakeholder to change or control the behaviour of other actors in the value chain". This influence can be built on various sources, for example position or formal role in the value chain.

The average level of influence throughout the entire value chain is 3.7. The most influential actors are in the Energy and EV chain, both scoring 4.1. The organisations providing knowledge report the lowest level of influence (3.4). Most influence is derived and exerted through a stakeholders' size of network (4.0) and knowledge in the value chain (4.3). The size of market share is the least important factor in determining influence (2.9).

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

When analysing the activity levels of all stakeholders to determine their willingness to exert influence, the Charging value chain and Providing regulation roles score the lowest (both 3.4). Most active are the funding providers (4.5). The Energy and EV chain both score 4.3 and the Knowledge providers report an activity level of 4.2. In general, all stakeholders in the survey report the highest level of activity for dialogues and collaborations with other organisations (both 4.4) and are least active in lobbying activities (3.0).

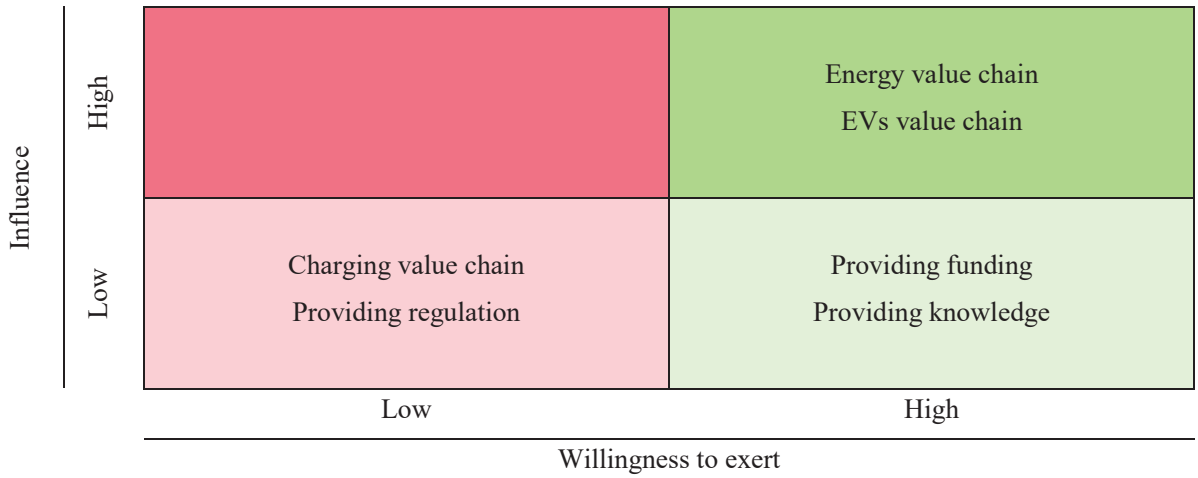


Figure 14: Position in status quo

Figure 14 shows that stakeholders in both Energy and EVs value chain both have the potential to have an influence on the value chain. Moreover, these stakeholders are also very willing to try and induce change. This willingness is also visible amongst those providing funding and knowledge. However, stakeholders in these roles have less potential to influence the value chain. The Charging value chain and providing regulation organisations report a low level of influence, and a low level of willingness to exert the influence they do have.

4.3.2 Position towards the future

Where the previous section describes the current situation, this section looks at the potential effects of the transition to zero emission mobility on stakeholders. It is important to gain insights in how and where the stakeholders will feel the effect of the transition. These potential effects are not a prediction of actual effects, but rather provide relevant understanding of stakeholders' perception. As such, the role stakeholders will take can be determined; either enabling or obstructing the transition to zero emission mobility.

The effects of the change towards the transition to local renewable energy production are perceived the most positive in the EV chain (3.7). The Energy and Charging value chain share the second place with a score of 3.5. Organisations active in providing knowledge are the least positive towards the effects of this transition, scoring just 2.9. The organisation providing regulation report a score 3.0, and those providing funding score 3.2. The supporting roles are therefore the least positive stakeholders regarding the transition to local renewable energy production. The primary value chains are the most positive.

As seen in the section above, the three primary value chains score higher than the supporting roles. The Charging value chain is leading (4.1) in smart charging, followed by the Energy chain (4.0) and the EV chain (3.7). Similar to the transition towards local RES, organisations active in providing knowledge are the least positive towards the effects of this transition, scoring only 2.9. The organisations providing regulation report 3.0, and those providing funding attribute themselves a score of 3.3. In conclusion, the stakeholders active in the primary value chains have a more positive stance towards the effects of the transition to zero emission mobility than those active in providing funding, knowledge or regulation.

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

4.3.3 Conclusion

Both the Energy and EVs value chain show potential to influence the GreenCharge value chain. In addition, these two value chains are willing to induce change. Knowledge and funding providers also display this willingness, but are less influential. The Charging value chain and regulation providers are less influential, and report lower levels of willingness to exert influence. Analysis of the way the effects of the transition to zero mobility are perceived shows the primary value chains reporting a more positive stance than those active in providing funding, knowledge or regulation.

4.4 Enablers, obstructers and observer

In the previous section, a classification has been made between those with a more positive stance towards the effects of the transition. This characteristic is the level of interest stakeholders have regarding the transition to zero emission mobility. Stakeholders scoring high on this attribute show a high interest in this change, whereas lower scoring stakeholders may have a higher interest in maintaining the status quo. Stakeholders can be categorized using these characteristics:

- Enablers are the stakeholders that combine influence and interest to become the pioneers in the transition to zero emission mobility.
- Obstructers are the stakeholders that have a large influence, but have no interest in change.
- Observers are the stakeholders that have low to medium influence. An 'enthusiastic observer' has a high interest in change, and a 'sceptic bystander' has a lower interest in change.

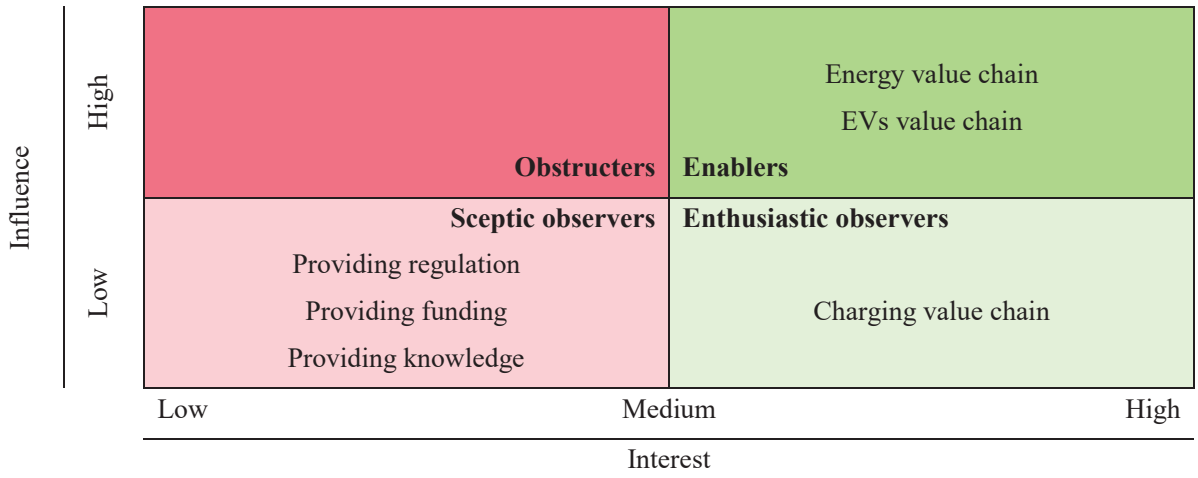


Figure 15: Enablers, obstructers, and observers

The categorization of the stakeholders is displayed by Figure 15. In this figure we find that there are no obstructers. The most enabling stakeholders are those in the Energy and EVs value chain. Stakeholders in the Charging value chain have the same interest as stakeholders in the Energy and EVs value chain, but less influence and are therefore classified as enthusiastic observers. The organisations that feel less interested about change are the three supporting roles. The regulation, funding and knowledge providers are all classified as sceptic observers. These supporting roles can develop a more positive stance if there are more successful EV projects that serve as a positive example. This enhances their willingness to invest, share knowledge or change regulations in order to boost the transition. GreenCharge aims to be such a project and constitute a positive example for uptake cities. Although no obstructers can be found in the figure, other external factors or actors may exist. They could form a barrier for the transition to be made. This possible barriers have to be further explored as part of the innovation management (task 1.3) of the project.

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

4.4.1 Conclusion

In conclusion, stakeholders in the Energy and EVs value chain are the key enablers for the transition to zero emission mobility. The Charging value chain will potentially fulfil a supportive role in the transition, where the stakeholders in the supporting roles will likely act as sceptic observers. Communication and dissemination activities might help in increasing interest in the transition amongst the stakeholders in the latter group. There are no obstructers to the transition discovered in the analysis. Nevertheless there will be further exploration for potential barriers as part of the innovation management.

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

5 European project analysis

Before analysing the European projects in and around the primary value chains, the European efforts directly linked to GreenCharge are to be discussed. CIVITAS is a network of cities for cities dedicated to cleaner, better transport in Europe and beyond. The initiative has tested and implemented over 800 measures and urban transport solutions from its start in 2002. During these endeavours, over 80 Living Lab cities have been the stage of demonstration projects.

Through CIVITAS, practitioners are provided with the opportunity to see innovative transport solutions being developed and deployed first-hand. Moreover, practitioners are able to learn from peers as well as experts active in the field. CIVITAS aims to create growth and better connected, more suitable transport modes by nurturing political commitment, new marketable solutions, and offering funding and knowledge exchange. CIVITAS has many projects falling under its umbrella; GreenCharge being one of them.

Another project falling under the CIVITAS umbrella is the MEISTER project. GreenCharge closely cooperates with the MEISTER project. MEISTER will deliver a set of tools to foster e-mobility large scale adoption in four ways: (1) by demonstrating innovative, sustainable business models to lower installation and operation costs of charging infrastructure, (2) by optimizing usage of infrastructure by the smart combination of charging and parking services, (3) by integrating EV within urban SUMPs, including the establishment of EV sharing and the inclusion of EV within MaaS schemas to reduce CO2 emissions and optimize urban space usage, and (4) by providing interoperable platforms and services to users for an easy, convenient and barrier-free access to charging, billing and smart grid services, including an increase of the use of renewable energy sources and self-generation to power EVs. In the following three chapters, an analysis of other European projects around the primary value chains is performed.

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

6 European project analysis: Charging value chain

This chapter is an analysis of the European projects in and around the Charging value chain. The following two chapters constitute the analyses of the other two primary value chains. In this section, key stakeholders are identified based on participation in European projects. The analysis is based on results obtained through the WHEESBEE tool. The full methodology can be found in Annex A. In total, 449 projects were found. All projects started in or after 2014, for this is the year the Horizon 2020 funding programme started. As such, some late FP7 projects may be amongst the results. These projects are considered relevant, for they started within 5 years of this study and are therefore not outdated. Projects before 2014 might be outdated, as the market of local renewable energy production and smart charging market is a rapidly changing and very dynamic. By only considering projects from 2014 and onwards, the most up-to-date and state-of-the-art projects are considered. More than €5.1 billion of funding was granted to these projects, averaging €11.3 million per project. In Figure 16, the number of projects initiated per year is visualized.

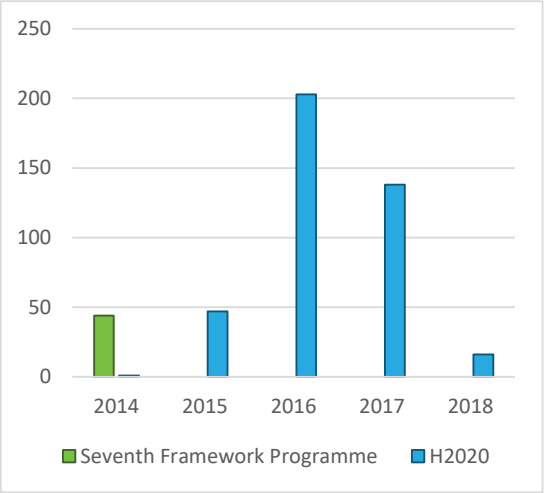


Figure 16: Projects around the Charging value chain over time

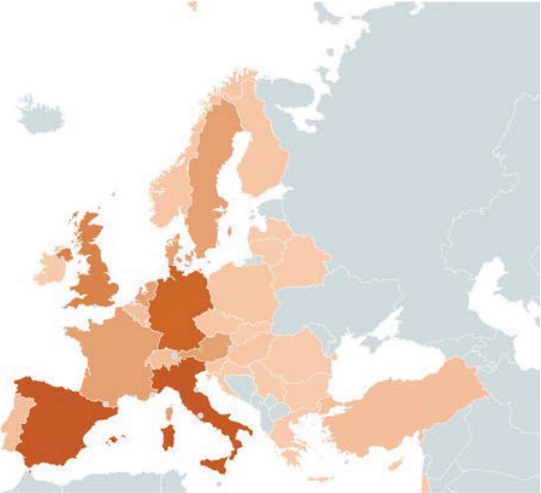


Figure 17: Project participation in European countries in the Charging value chain

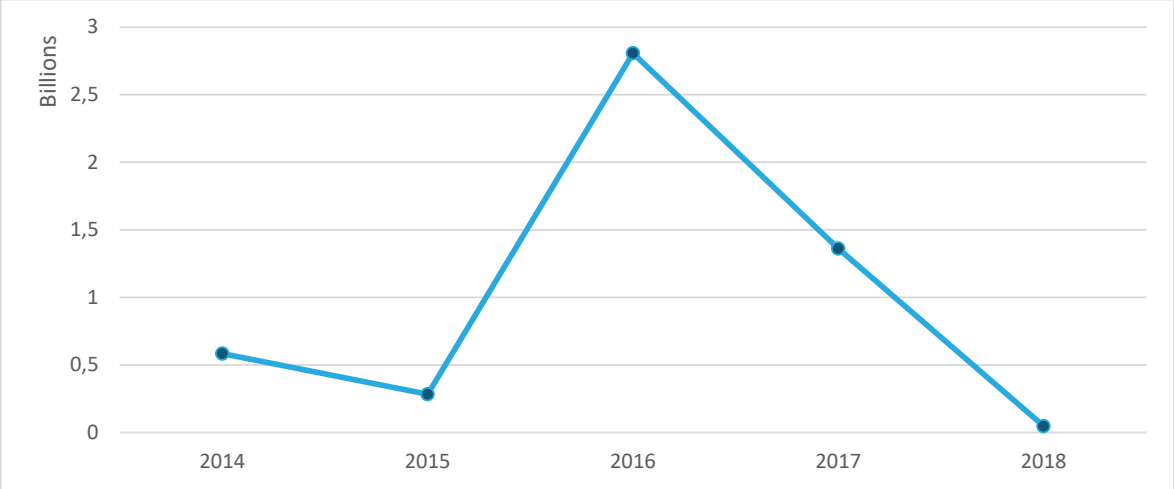


Figure 18: Overall funding per year in the Charging value chain

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

The trend observed in Figure 16 is: the number of projects around the 'Charging' theme have been increasing from 2015 to 2016, but have been decreasing ever since.. The projects initiated in 2018 are not at 2017-levels yet, this might be due to the fact this year was still in progress, for this analysis was performed in October 2018.

Figure 17 is a visualization of the participation in EU projects for the Charging value chain per country. The figure was composed by counting the countries of origin of the organisations in the project corpus. The most active participants are Italy and Spain, with 64 and 63 projects participated in, respectively. They are followed by Germany and the UK and, to a lesser extent, France, Greece, Austria and Denmark.

The increase in funding from 2015 to 2016 displayed in Figure 18 can be attributed to the growth in projects as seen in Figure 16. Where there is an increase in number of projects from 2016 to 2017, the total amount of funding has decreased. This means that the average funding per project has decreased from 2016 to 2017. As 2018 was still in progress at the time of the analysis, the overall funding is in this year very low. The overall funding will naturally depend on the number of projects. Therefore, currently no forecasts can be made of what is to be the expected overall funding for 2018. In total, 334 different organisations were involved, of which 87 participated in more than one project. The top ten most active organisations are displayed in Table 9.

Table 9: Top participants in projects in the Charging value chain

Organisation	**#**
Die Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e. V. (DE)	**7**
Institute of Communication & Computer Systems (GR)	**6**
Atos Spain SA (ES)	**4**
AIT Austrian Institute Of Technology GmbH (AT)	**4**
Consiglio Nazionale delle Ricerche (IT)	**4**
Lithium Balance AS (DK)	**3**
Commissariat à l'énergie atomique et aux énergies alternatives (FR)	**3**
Etrel Svetovanje in Druge Storitve DOO (SI)	**3**
Vectos (South) Ltd. (UK)	**2**
VDL Enabling Transport Solutions BV (NL)	**2**

Presently, six European projects are running in the context of the Horizon 2020 programme around the Charging value chain. All six projects have at least some overlap in subjects with GreenCharge. Information on these projects can be found in the website mentioned in the box below.

EMEurope (coordinator: TÜV Rheinland Consulting GmbH): In collaboration with the European Commission and the European Green Vehicles Initiative Association, European countries and regions will set-up an ERA-NET Cofund to further promote electric mobility in Europe. Electric Mobility Europe builds on the experiences, networks and results of Electromobility+ and is designed to take transnational e-mobility research and policy exchange to the next level.
(https://www.electricmobilityeurope.eu/)

lif-e-Buoy (coordinator: Willisits Mérnökiroda Kft.): The lif-E-Buoy project is a facility using the hydrokinetic energy of running water as a clean energy source for charging of electrical road vehicles (cars, bicycles, etc.) and provide noise and emission free electricity output for other applications such as large

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

cruiser boats or for freight vessels stopping in city centres as a good alternative to running their generators. (https://cordis.europa.eu/project/rcn/213863_en.html)

MEISTER (coordinator: ETRA Investigación y Desarrollo S.A.): MEISTER aims at creating the conditions for smart e-mobility market take up in cities, by means of developing integrated approaches, smart solutions and innovative, sustainable business models, which will be tested and validated in three urban areas in Southern, Central and Northern Europe: Malaga (Spain), Berlin (Germany), and Gothenburg (Sweden). (https://cordis.europa.eu/project/rcn/215995_en.html)

Powerswap (coordinator: Powerswap AB): Powerswap makes the bold step forward addressing challenges related to smart and clean e-mobility as charging time of batteries in battery storage can be flexibly adapted, minimizing additional pressure on power systems. Our automated batteries storages can also provide "grid balancing" services and return power to the grid at a time when managing the network is becoming increasingly complex as variable sources of wind and solar power grow.
(http://powerswap.se/)

Replicate (coordinator: Ayuntamiento de Donostia San Sebastián): The objective of REPLICATE is to demonstrate Smart City technologies in energy, transport and ICT in districts in San Sebastia, Florence and Bristol addressing urban complexity and generate replication plans in other districts and in follower cities of Essen, Nilufer and Lausanne.
(https://replicate-project.eu/)

SmartCharge (coordinator Lithium Balance A/S): LiBAL has developed a novel Integrated Circuit for Advanced Battery Management (ICAB). ICAB is an ASIC-based integrated circuit to be deployed as a local monitoring unit within large Battery Management Systems. LiBAL has not only to widely demonstrate it in full scale but also to consolidate our strategic partnering throughout the EVs value chain to ensure enough muscle for ICAB's production ramp-up.
(https://cordis.europa.eu/project/rcn/213884_en.html)

The descriptions of the projects above mainly focusses on the project ambitions and technical actions taken. Also, policy processes are in many cases crucial to realise the set goals and ambitions. For example, one of the main objectives of the MEISTER project is the integration of e-mobility in the cities' SUMPs and city planning process. In the Replicate project the authorities of the pilot cities focusses on creating a smart city with a large role for sustainable mobility. Because of the overarching role of local authorities, their role in European projects cannot be placed in a single value chain, such as the charging value chain. Therefore the role of the authorities is described solely at the end of each project chapter.

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

7 European project analysis: Energy value chain

This chapter is an analysis of the European projects in and around the Energy value chain. In this section, key stakeholders are identified based on participation in European projects. The analysis is based on results obtained through the WHEESBEE tool. The full methodology can be found in Annex A. In total, 884 projects were found. All projects started in or after 2014, for this is the year the Horizon 2020 funding programme started. The environment around both local renewable energy production and smart charging is dynamic and quickly changing. By only considering projects from 2014 and onwards, the most up-to-date and state-of-the-art projects are considered. More than €8.8 billions of funding was granted to these projects, averaging €10.0 million per project.

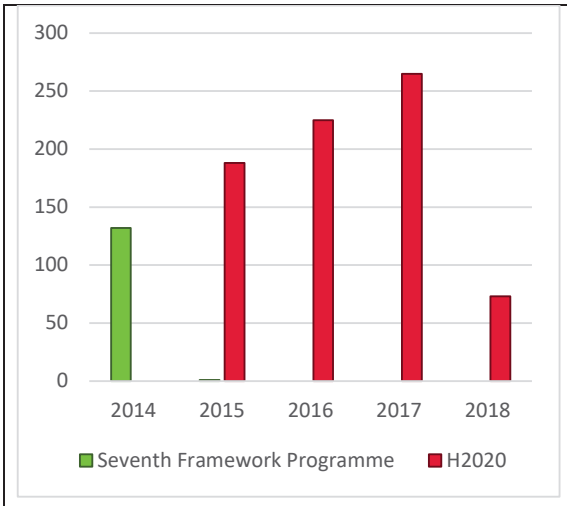


Figure 19: Projects around the Energy value chain over time

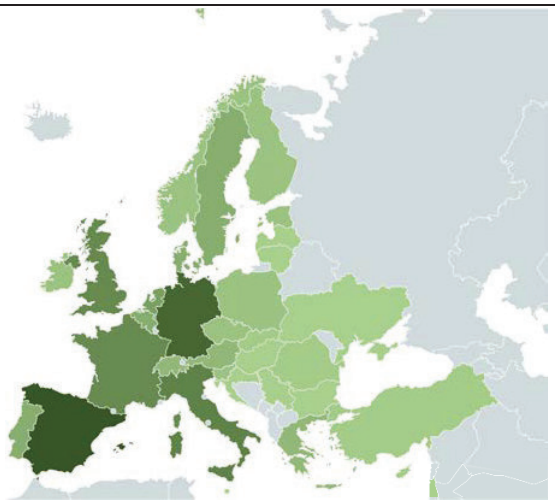


Figure 20: Project participation in European countries in the Energy value chain

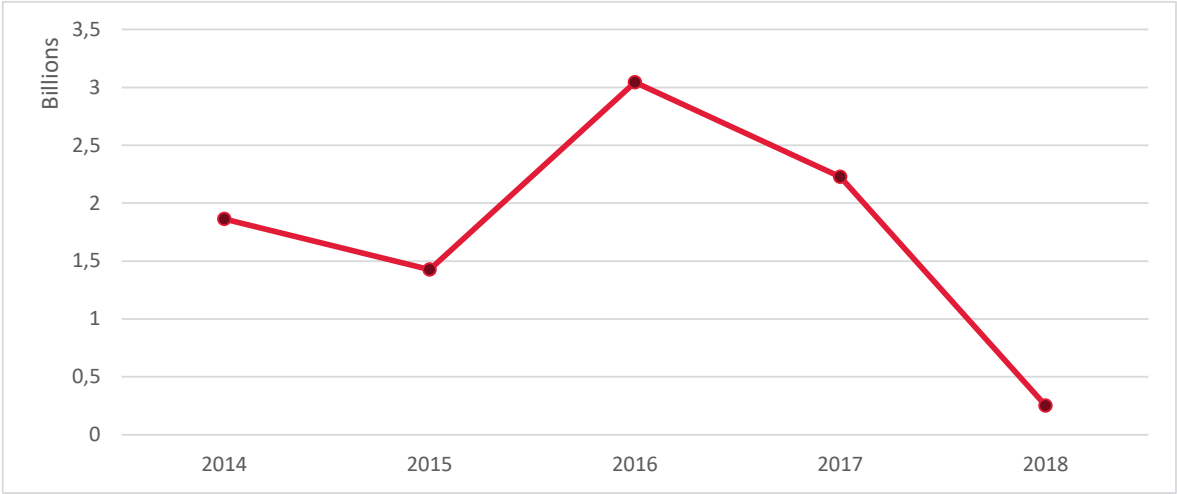


Figure 21: Overall funding per year in the Energy value chain

In Figure 19, the number of projects initiated per year is visualized. The trend that can be observed in Figure 19 is that the number of projects around the 'Energy' theme have been increasing from 2014 and onwards. The projects initiated in 2018 are not at 2017-levels yet, this might be due to the fact this year was still in progress, for this analysis was performed in October 2018.

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

Figure 20 is a visualization of the participation in EU projects for the Energy value chain per country. The figure was composed by counting the countries of origin of the organisations in the project corpus. The most active participants are located in Western and Southern Europe. Spain and Germany rank first and second, with respectively 128 and 110 projects participated in. Following these countries are Italy, the UK and France, and, to a lesser extent, the Scandinavian countries of Sweden and Denmark.

Even though Figure 19 shows an increase in the number of projects, the overall funding has only decreased from 2015 to 2016 in Figure 21. There is a notable decrease from 2016 to 2017. As 2018 was still in progress at the time of the analysis, the overall funding is relatively low. The overall funding will naturally depend on the number of projects. Therefore, currently no forecasts can be made of what is to be the expected overall funding for 2018. As for the participants in these projects, 689 different organisations were involved, of which 106 participated in more than one project. The top ten most active organisations are displayed in Table 10.

Table 10: Top participants in projects in the Energy value chain

Organisation	**#**
Die Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e. V. (DE)	**13**
Commissariat à l'énergie atomique et aux énergies alternatives (FR)	**11**
Fundacion Tecnalia Research & Innovation (ES)	**8**
Teknologian Tutkimuskeskus VTT Oy (FI)	**7**
AIT Austrian Institute Of Technology GmbH (AT)	**6**
Vlaamse Instelling voor Technologisch Onderzoek N.V. (BE)	**6**
Rheinisch-Westfaelische Technische Hochschule Aachen (DE)	**6**
Danmarks Tekniske Universitet (DK)	**5**
The University Of Nottingham (UK)	**5**
Électricité de France (FR)	**5**

Universities and Research and Technology Organisations are the most common type of organisations in Table 10. The top five most active industrial partners are: (1) Électricité de France, (2) E-Distribuzione, (3) R2M Solution Srl, (4) Siemens Aktiengesellschaft, (5) Engineering – Ingegneria Informatica. Where Électricié de France has participated in five projects (see Table 10) and the others in four projects.

Presently, seven European projects are running in the context of the Horizon 2020 programme around the Energy value chain. All seven projects have at least some overlap in subjects with GreenCharge. Information on these projects can be found in the website mentioned in the box below.

EERASE3 (coordinator: Alliance européenne de recherche dans le domaine de l'énergie): The purpose of EERA is to strengthen and expand Europe's capabilities in sustainable energy research by connecting and joining European energy research activities. EERASE3 is one of many projects of this alliance. (https://www.eera-set.eu/)

EU-SysFlex (coordinator: EirGrid PLC): The overall objective is to ensure an efficient and sufficient level of system services are provided to facilitate meeting world leading levels of Renewable Energy Sources while maintaining the level of resilience that consumers and society have come to expect from the European electricity system.
(https://cordis.europa.eu/project/rcn/212400/factsheet/en)

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

FerroHub (coordinator: Ferroamp Elektronik AB): An innovative electronic hub leveraging several patents, which fully supports smart grids. The solution incorporates a Photovoltaics inverter, energy storage and the necessary hardware and software to handle power flow to and from the network, as well as other innovative technologies that augment the stability of the power network and empower the users to gain control of their energy costs.
(https://www.ferroamp.com/project-ferrohub-h2020)

ICE (coordinator: École polytechnique fédérale de Lausanne): The ICE project will demonstrate that energy regulation services can be provided to the smart grid in a technically reliable and financially lucrative fashion by utilizing a combination of smart commercial buildings and commercial batteries.
(http://erc.europa.eu/)

MODER (coordinator: Sweco Finland Oy): The main objective of MODER is to increase business of engineering companies, energy managers and consultants in supporting municipalities and building owners in European and global markets for the refurbishment of buildings at district level. (http://www.moderproject.eu/)

PVPS (coordinator: EMSc (UK) Ltd): Powerstar Virtue aims to pilot-test an integrated smart grid solution based on the Powerstar system design with storage mediums and renewable energy sources. (http://powerstar.com/pvps-project/)

SYNCHRONVERTER (coordinator Synvertec): The Synchronverter facilitates the connection of renewable energy sources and distributed energy resources to the grid causing a conventional inverter to mimic a synchronous generator, consequently, these power sources can actively participate in the grid stabilization in harmony with other generators.
(https://www.synvertec.com/solution-overview)

The descriptions of the projects above mainly focusses on the project ambitions and technical actions taken. Also, policy processes are in many cases crucial to realise the set goals and ambitions. For example, the MODER project is focussed on developing tools for design at district and neighbourhood level that enable the comparison of different alternatives of RES systems. The role of municipalities is extremely important in this project. Municipalities should be proactive, far seeing and flexible in their town planning. They should act as a local facilitator supporting collaboration with owners, owner-occupants, contractors and others. Because of the overarching role of local authorities, their role in European projects cannot be placed in a single value chain, such as the energy value chain. Therefore the role of the authorities is described solely at the end of each project chapter.

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

8 European project analysis: Electric Vehicle chain

This chapter is an analysis of the European projects in and around the Electric vehicle value chain. In this section, key stakeholders are identified based on participation in European projects. The analysis is based on results obtained through the WHEESBEE tool. The full methodology can be found in Annex A. In total, 577 projects were found. All projects started in or after 2014, for this is the year the Horizon 2020 funding programme started. The environment around both local renewable energy production and smart charging is dynamic and quickly changing. By only considering projects from 2014 and onwards, the most up-to-date and state-of-the-art projects are considered. More than €4.1 billion of funding was granted to these projects, averaging €7.0 million per project.

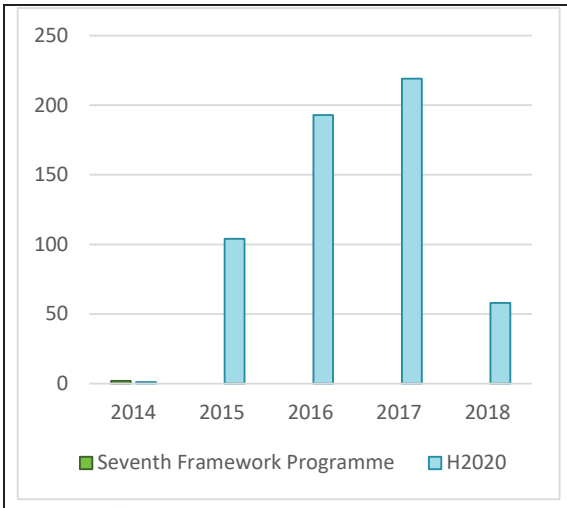


Figure 22: Projects around the Electric Vehicle value chain over time

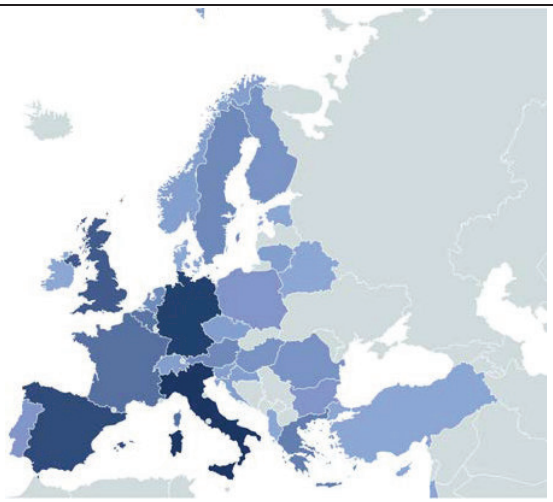


Figure 23: Project participation in European countries in the Energy value chain

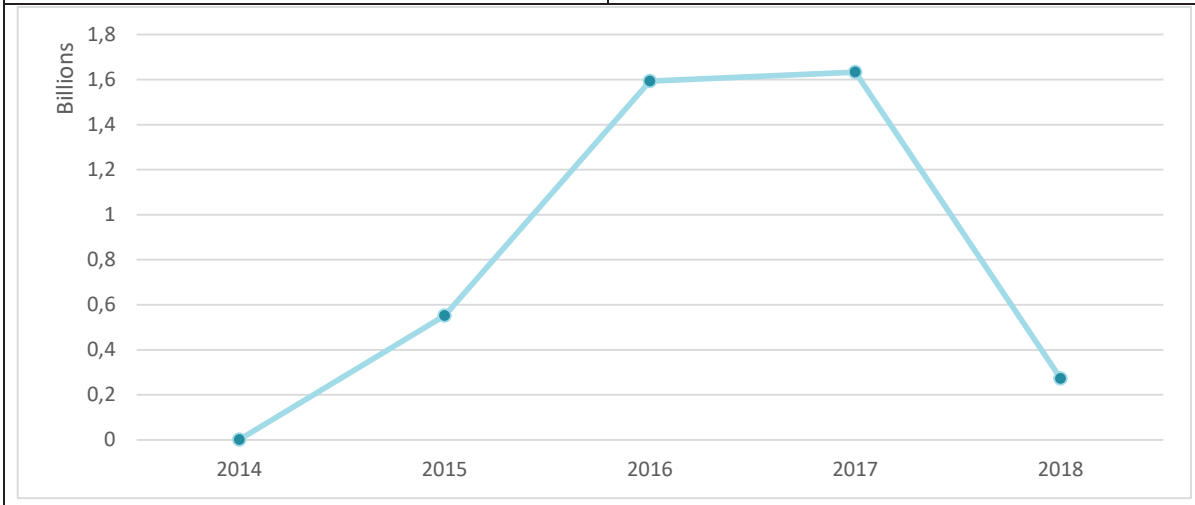


Figure 24: Overall funding per year in the Electric Vehicles value chain

In Figure 22, the number of projects initiated per year is visualized. The trend that can be observed in Figure 22 is that the number of projects around the 'Electric Vehicles' theme have been increasing from 2014 and onwards. The projects initiated in 2018 are not at 2017-levels yet, this might be due to the fact this year was still in progress, for this analysis was performed in October 2018. Figure 23 is a visualization of the participation in EU projects for the Electric Vehicles value chain per country. The figure was composed by

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

counting the countries of origin of the organisations in the project corpus. The most active participants are located in Western and Southern Europe. Italy ranks first with 80 projects participated in. Following Italy are Germany, Spain and the UK and, to a lesser extent, France, Belgium and Greece.

The overall funding in Figure 24 follows the same growth trend as the number of projects portrayed in Figure 23. As 2018 was still in progress at the time of the analysis, the overall funding is very low. The overall funding will naturally depend on the number of projects. Therefore, currently no forecasts can be made of what is to be the expected overall funding for 2018. As for the participants in these projects, 500 different organisations were involved, of which 53 participated in more than one project. The top ten most active organisations are displayed in Table 11.

Table 11: Top participants in projects in the Electric Vehicles value chain

Organisation	**#**
Ethniko Kentro Erevnas kai technologikis anaptyxis (EL)	**7**
Die Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e. V. (DE)	**6**
Union des transports publics (FR)	**5**
POLIS (International Association)	**4**
BKK Budapesti Közlekedési Központ (HU)	**3**
ICLEI - European Secretariat GmbH (DE)	**3**
Consorzio Per L'Area Di Ricerca Scientifica E Tecnologica (IT)	**3**
Forschungsgesellschaft Mobilität (AT)	**3**
Freie Hansestadt Bremen (DE)	**3**
Edinburgh Napier University (UK)	**3**

Universities and RTO are the most common type of organisations in Table 11. The top five most active industrial partners are: (1) BKK Budapesti Közlekedési Központ (HU), (2) Rupprecht Consult-Forschung & Beratung GmbH (DE), (3) Vectos South LTD (UK), (4) Mobilissimus Korlátolt Felelősségű Társaság (HU), and (5) INTRASOFT International S.A. (LU). The first three have participated in three projects each, the latter two have been involved in two projects each.

Presently, 32 European projects are running in the context of the Horizon 2020 programme around the Electric Vehicles value chain. From these 32 projects, 19 have been listed in the box below, for they have at least some overlap in subjects with GreenCharge. Information on these projects can be found in the website mentioned in the box below. GreenCharge aims to make information on these projects available for its stakeholders.

ASSURED (coordinator: Vrije Universiteit Brussel): The ASSURED Project proposal addresses the topic GV-08-2017, “Electrified urban commercial vehicles integration with fast charging infrastructure” of the Green Vehicle work programme.

CIVITAS ECCENTRIC (coordinator: Ayuntamiento de Madrid): CIVITAS ECCENTRIC will demonstrate the potential and replicability of integrated and inclusive urban planning approaches, innovative policies and emerging technologies in five European cities: Madrid, Stockholm, Munich, Turku and Ruse. The project will test clean vehicles and fuels, develop consolidation solutions and draft new regulations and services in close partnership with the private sector.
(https://cordis.europa.eu/project/rcn/204474_en.html)

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

DEMOBASE (coordinator: SAFT): DEMOBASE is composed of 11 leading European partners with activities ranging from cells to vehicle to recycling. The main gain at vehicle level will come from global optimization taking into account interaction of the different specialties. (https://www.demobase-project.eu/)

ELECTRIFIC (coordinator: GFI): ELECTRIFIC will revolutionise how electric vehicles are integrated into power grid and users' life. The fundamental premise on which the project will work that significant improvements to electromobility can be unlocked by increasing coordination of all the actors in the electromobility ecosystem.
(https://electrific.eu/)

EMEurope (coordinator: TÜV Rheinland Consulting GmbH): In collaboration with the European Commission and the European Green Vehicles Initiative Association, European countries and regions will set-up an ERA-NET Cofund to further promote electric mobility in Europe. Electric Mobility Europe builds on the experiences, networks and results of Electromobility+ and is designed to take transnational e-mobility research and policy exchange to the next level. (https://www.electricmobilityeurope.eu/)

GALILEO 4 Mobility (coordinator: Pildo Labs Wessex Ltd.): GALILEO 4 Mobility aims at supporting the introduction of GALILEO technology within the Mobility as a Service context, by analysing the needs in terms of geolocation of the different stakeholders involved and demonstrating the benefits of GALILEO through pilot demonstrators of shared mobility. (http://www.galileo4mobility.eu/)

IMOVE (coordinator: Softeco Sismat S.r.l.): IMOVE will learn from such initiatives as UBIGO in Gothenburg or Hannovermobil, launched a decade ago in Hannover, and will step forward contributing to radically change mobility paradigms bringing in disruptive elements of mobility services.
(https://www.imove-project.eu/)

MaaS4EU (coordinator: INTRASOFT International S.A.): The main goal of MaaS4EU is to provide quantifiable evidence, frameworks and tools, to remove the barriers and enable a cooperative and interconnected EU single transport market for the MaaS concept, by addressing challenges at 4 levels, (1) business, (2) end-users, (3) technology and (4) policy.
(http://www.maas4eu.eu/)

MEISTER (coordinator: ETRA Investigación y Desarrollo S.A.): MEISTER aims at creating the conditions for smart e-mobility market take up in cities, by means of developing integrated approaches, smart solutions and innovative, sustainable business models, which will be tested and validated in three urban areas in Southern, Central and Northern Europe: Malaga (Spain), Berlin (Germany), and Gothenburg (Sweden).
(https://cordis.europa.eu/project/rcn/215995_en.html)

Mobility4EU (coordinator: Univeristy of Newcastle upon Tyne): The MOBILITY4EU project will develop such a plan taking into account all modes of transport as well as a multitude of societal drivers encompassing health, environment and climate protection, public safety and security, demographic change, urbanisation and globalisation, economic development, digitalisation and smart system integration.
(https://www.mobility4eu.eu/)

MyCorridor (coordinator: VDI/VDE Innovation + Technik GmbH, Geschäftsstelle Bonn): MyCorridor mission is to facilitate sustainable travel in urban and interurban areas and across borders by replacing private vehicle ownership by private vehicle use, as just one element in an integrated/multi-modal MaaS chain, through the provision of an innovative platform, based on mature ITS technology, that will combine connected traffic management and multi modal services and thus facilitate modal shift.
(http://www.mycorridor.eu/)

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

NeMo (coordinator: Area Di Ricerca Scientifica E Tecnologica): NeMo will raise awareness, liaise with standardisation bodies and contribute to the evolution of protocols and standards by developing public Common Information Models which incorporate all existing electromobility related standards and constantly update them to reflect standards evolution. NeMo will also propose sustainable business models for all electromobility actors opening new opportunities for SMEs and EU Industry.
(https://nemo-emobility.eu/)

Park4SUMP (coordinator: Mobiel 21): Most EU member states lack national level policy and guidance on parking. PARK4SUMP aims to change this, because good parking management has proved to be of utmost importance. The general concept is to take the very best parking management examples, contexts and expertise in Europe, learn and profit from these, and transfer them on a large scale and in the best way possible to new cities.
(https://cordis.europa.eu/project/rcn/215998_en.html)

PROSPERITY (coordinator: Forschungsgesellschaft Mobilität): The core concept of PROSPERITY is bringing ministries into the project, which will significantly enhance the visibility of the project at the national level and therefore increase numbers of cities active on SUMPs.
(https://cordis.europa.eu/project/rcn/204145_en.html)

SIMPLA (coordinator: Consorzio Per L'Area Di Ricerca Scientifica E Tecnologica): SIMPLA aims to create the conditions for a smart integration between Sustainable Energy Plans (SEAPs) and Sustainable Urban Mobility Plans (SUMPS) – or similar plans – in cities, towns and their aggregations with a population between 50.000 to 350.000 inhabitants.
(http://www.simpla-project.eu/en/)

SMASH (coordinator GreenSpider GmbH): SMASH is a Smart Sharing Device aiming to improve the access and the fruition of innovative urban mobility, through the combined use of satellite tracking technology and wireless transmission, embedded in a single miniaturized device.
(http://www.greenspider.eu/)

SMILE (coordinator: Ethniko Kentro Erevnas kai technologikis anaptyxis): The development of Smart grids are an important prerequisite for the transition towards a clean, affordable and reliable energy system. Through Smart grids, peak demand can be reduced and the energy grid can be stabilized. Therefore, the development of market ready technologies that facilitate this transition are important. The Smart Islands Energy System (SMILE) project will demonstrate nine different smart grid technologies on three different islands. The end goal of the project is to foster the market introduction of these nine technologies..
(http://www.h2020smile.eu/)

STEVE (coordinator: Infineon Technologies Austria AG): The primary idea of STEVE is to implement and test a human-centric approach to electro-Mobility-as-a-Service (eMaaS), according to the "Move2Me" vision of the consortium. This will provide low-cost and financially sustainable LEV solutions and "gamified" services, to enhance users' awareness, engagement and vehicle energy efficiency.
(http://www.steve-project.eu/index.php/en/)

SUMPs-UP (coordinator: ICLEI - European Secretariat GmbH): Through SUMPs-Up, an experienced consortium of public and private organisations, including four major city networks and seven frontrunner cities, skilled in coordinating major European SUMP projects will accelerate the take-up of SUMPs, where this is currently low, ensuring that SUMP is the primary mobility planning concept in Europe.
(http://sumps-up.eu/)

The descriptions of the projects above mainly focusses on the project ambitions and technical actions taken. Also, policy processes are in many cases crucial to realise the set goals and ambitions. For example, the

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

Park4SUMP project pays attention to national level policy and guidance on parking. Parking management should be an important part of sustainable urban mobility planning (SUMP) but it is one of the most underdeveloped segments. The PROSPERITY project has a focus on producing a culture shift in terms of environment for SUMPs in the EU member states and in the organisational culture of transport planning in city authorities. Because of the overarching role of local authorities, their role in European projects cannot be placed in a single value chain, such as the electric vehicle value chain. Therefore the role of the authorities is described solely at the end of each project chapter.

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

9 Conclusion

The findings in this report are to be used as the basis for WP8. With this empirically proven basis, targeted dissemination and exploitations strategies and plans will be developed and implemented. Moreover, an engagement strategy shall be developed. As such, the stakeholders identified in this report will be actively engaged in following the project activities and results. In addition, stakeholders may find themselves in the opportunity to provide advice on the project development and exploitation of the results.

Accompanying the process of creating a dissemination and exploitation strategy described above, is the process of building a communication strategy. Where the dissemination and engagement strategy should focus on making the project results available to specific stakeholders of the GreenCharge project, the communication strategy should aim to raise awareness about the project and its results to a multitude of audiences. These audiences include the media and the public, and GreenCharge aims to engage with the public and uptake cities in a two-way exchange. The uptake cities will tell the consortium about their desires and problems for electric mobility, and the consortium will try and show the uptake cities what the consortium think that works but also change and modify the GreenCharge approach to best meet the needs of the uptake cities. This dialogue between the consortium and the uptake cities will be organised through 5 webinars and 3 site visits. The communication should aim to reach out to society as a whole while demonstrating how EU funding is used to tackle societal challenges while generating business for (local) entrepreneurs.

Stakeholders are to be engaged with one of three goals in mind:

1. Empowering the enabling stakeholders,
2. Activating the enthusiastic observers and moving them into the enabler,
3. Transitioning sceptic observers into enthusiastic observers.

As seen in Figure 15, the enabling stakeholders are those in the Energy and EV value chain. The stakeholders in the Charging value chain are classified as enthusiastic observers. The supporting roles are more sceptic observers.

Increasing empowerment is crucial in achieving goals 1 and 2. Through empowerment, the enabling stakeholders will increase their enabling ability even further. On the other hand, empowering the organisations in the enthusiastic observers category may move them into the ‘enablers’ category. Empowerment can be realised in many ways. One way is finding what each stakeholder does best, by looking for ways in which stakeholders can strengthen one another. GreenCharge can play a vital role by bringing stakeholders together, supporting, encouraging and informing them.

Higher levels of empowerment can also be achieved by accepting failure. GreenCharge should try to encourage curiosity by forgiving a stakeholder when testing a new method or technique shows it is dysfunctional. However, actually continuing using this method or technique should be regarded as a mistake. The effort put in finding new methods or techniques and accepting that failures are part of this process is something to be praised. By praising effort, stakeholders will feel encouraged to learn and improve. GreenCharge could praise efforts by highlighting new findings and outstanding performances in the newsletter or on the website.

Reaching goal 3 entails increasing enthusiasm amongst the sceptic observers. GreenCharge has the potential of enthusing stakeholders in various ways. The best way to enthuse stakeholders is formulating a clear mission statement or a set of individualized stakeholder goals. The final step is warranting positive feedback on actual performed work. Something as simple as a project-wide e-mail thanking a stakeholder for their work, or mentioning a stakeholder during a congress or meeting can make a considerable impact on stakeholders’ enthusiasm. The accomplishments do not have to be major ones. Setting small goals and reaching them will make stakeholders feel a boost of excitement. These ‘quick wins’ will also increase the believe of the sceptic observers in the potential of further growth. A streak of quick wins builds the momentum to increase enthusiasm even further. Specialized training might help stakeholders with reaching the set goals. People require coaching aimed at improvement, not fear. This will enable them to learn from mistakes and feel inspired to get better at what they do.

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

There are not many things that decrease the feeling of enthusiasm faster than feeling unheard and misunderstood. GreenCharge should engage in a dialogue with stakeholders, finding out if there are any issues or questions. An 'open day' might be one way of engaging in dialogue with stakeholders. Another action GreenCharge can take is providing feedback on how stakeholders can improve. This will increase stakeholders' self-esteem. Both formal and informal regular feedback moments are to be used. If GreenCharge itself is not able to provide the right feedback, perhaps other stakeholders are. Enthusiasm can be increased by forming new teams and promoting teamwork. Stakeholders will then be able to work and learn together. Moreover, enthusiasm will not only grow on an individual level, stakeholders can inspire enthusiasm amongst each other.

Engaging stakeholders throughout the GreenCharge value chain may require different approaches per stakeholder group. An overview of these differences is provided in Table 13 and Table 13. In terms of knowledge, almost every stakeholder group has a lack of knowledge about charging booking services and charging billing services (except the Charging value chain). For the Energy value chain and the funding and regulation providers there must be a focus on providing knowledge about car-sharing also. It is important to keep in mind that the overview in table 12 displays the self-imposed knowledge of the stakeholder groups instead of the 'true' tested knowledge.

Table 12 – Knowledge per stakeholder group (more than average)

	Charging	Energy	EV	Providing funding	Providing knowledge	Providing regulation
Charging facilities	X	X	X	X	X	X
Car-sharing	X		X		X	
Local Renewable Energy	X	X	X	X	X	X
Energy storage	X	X	X	X	X	X
Smart Energy Management	X	X		X	X	X
Charging booking services	X					
Charging billing services	X					X
Energy grids	X	X	X	X	X	X
Sustainable Urban Mobility Plans (SUMPs)	X		X	X	X	X
Energy Smart Neighbourhoods (ESNs)		X		X	X	X

When engaging stakeholders from the Energy, Charging or EVs value chain, the topics of e-Roaming booking & billing, charging infrastructure utilisation and investment, the effective use of locally produced renewable

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

energy, and peak loads are to be discussed. These are the main concerns in the primary value chain. To increase enthusiasm amongst supporting roles, the accessibility of charging, the integration of the GreenCharge system with the entire transport system, and the way actors in and around the GreenCharge value chain benefit from the GreenCharge system. Moreover, the Business Models to be developed during the GreenCharge project are a very valuable asset in taking away concerns regarding economic viability and fairness. These Business Models are paramount in stimulating enthusiasm and empowerment. Of course, it is important to also disseminate information about other topics as they can support in influencing thoughts, minds and actions of the stakeholders.

Table 13: Engagement content per stakeholder group

	Primary value chains			Supporting roles		
	Charging	**Energy**	**EV**	**Providing funding**	**Providing knowledge**	**Providing regulation**
Energy Smart Neighbourhoods	X	X	X	X	X	X
Economic viability	X	X	X	X	X	X
Multi-actor provision	X	X	X			
Charging infrastructure utilisation	X	X	X			
Effective use of local renewable energy source	X	X	X			
Charging infrastructure investment	X	X	X			
Charging accessibility	X			X	X	X
Avoidance of peak loads		X	X			X
Integration				X	X	X
Fairness				X	X	X
Viability				X		
Charging costs					X	

The enabling stakeholders in the Energy and EV value chain benefit from GreenCharge disseminating new knowledge around Energy Smart Neighbourhoods. The focus should be on increasing the attitude towards the economic viability of local renewable energy production and smart charging solutions. These strategies will

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

also help in moving the stakeholders in the Charging value chain from enthusiastic observers into enabling stakeholders. Another vital topic for the Charging value chain stakeholders is the accessibility of charging.

All in all, different stakeholders require different approaches. Interests differ amongst value chains, and not every concern is shared throughout the entire GreenCharge value chain. Therefore, it is important to find the correct way in which these stakeholders are engaged. To reach the goals set by this report, GreenCharge must aim to increase enthusiasm as well as create the feeling of empowerment. This report has provided some insights and possible tools to reach these goals, that will be taken into account in Work Package 8.

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

10 References

Bryson, J. M. (2003). What to do when stakeholders matter: A guide to stakeholder identification and analysis techniques. A paper presented at the London School of Economics and Political Science, 10.

Bryson, J. M. (2018). Strategic planning for public and nonprofit organizations: A guide to strengthening and sustaining organizational achievement. John Wiley & Sons..

Fishbein, M. (1979). A theory of reasoned action: Some applications and implications.

Johnson, G., Scholes, K., & Whittington, R. (2008). Exploring corporate strategy: text & cases. Pearson education.

Madden, T. J., Ellen, P. S., & Ajzen, I. (1992). A comparison of the theory of planned behavior and the theory of reasoned action. Personality and social psychology Bulletin, 18(1), 3-9.

Montano, D. E., & Kasprzyk, D. (2015). Theory of reasoned action, theory of planned behavior, and the integrated behavioral model. Health behavior: Theory, research and practice, 95-124.

Otieno, O. C., Liyala, S., Odongo, B. C., & Abeka, S. O. (2016). Theory of reasoned action as an underpinning to technological innovation adoption studies.

Sheppard, B. H., Hartwick, J., & Warshaw, P. R. (1988). The theory of reasoned action: A meta-analysis of past research with recommendations for modifications and future research. Journal of consumer research, 15(3), 325-343.

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

A Survey methodology

A stakeholder survey was conducted to generate more in-depth information about the value chains. This survey served two purposes. Firstly, to map the playing field in terms of organisations' knowledge, attitudes, concerns. Secondly, to identify key collaborations, influencers, and interested stakeholders. Care was put into balancing academic composition of the questions, specific stakeholder input to the project and user-friendliness. In the following sections, the main methodological aspects of the survey components are discussed.

A.1 Definition of a value chain stakeholder

The term stakeholder has various definitions. There are broad, more inclusive definitions such as "anyone who might be involved in or impacted by the project" or "any person, group, or organisation that can place a claim on the project partner's attention, resources or outputs or is affected by that output" (Bryson, 2018). On the other hand, more precise definition can be used, such as "those individuals or groups who depend on the project to fulfil their goals and on whom, in turn, the project depends" (Johnson and Scholes, 2008; Bryson, 2003). For this analysis, a stakeholder is defined as: *an organisation which might be involved in or impacted by the GreenCharge project*. This organisational perspective is chosen, because any formalized interaction (e.g. collaboration) between GreenCharge and a possible stakeholder will always take place on the organisational level. Even if this interaction is usually initiated by individual representatives of an organisation. However, individual representatives or stakeholders are not able to directly engage with the GreenCharge project without support from their organisation. Therefore, this stakeholder analysis will identify the position of stakeholders on organisational level, by asking individual members of organisations what they think about the position of their organisation towards the GreenCharge project. The study focuses specifically on three different value chains: (1) Charging, (2) Energy, (3) Electric Vehicles.

Being involved in or impacted by a project is defined differently in various stakeholder analyses. Hypothetically speaking, in one study, being involved in or impacted by might mean that the entire organisation is affected by changes that a project makes in the value chain. Other analyses indicate an organisation as being involved in or impacted by changes in the value chain when only a very select part of the organisation is affected. Therefore, this study makes a distinction between primary, secondary and tertiary stakeholders:

- Primary stakeholders: actors that are directly involved in the value chain. Changes in the value chain have direct consequences for the (core) activities of these actors.
- Secondary stakeholders: actors that are indirectly involved in the value chain e.g. by performing supporting, enabling or regulatory activities. Changes in the value chain do not have direct consequences for the (core) activities of these actors. However, these actors can influence (or be influenced by) change in a value chain
- Tertiary stakeholders – Actors that do not have an involvement in the value chain, but (potentially) can become involved. As tertiary stakeholders, these actors are by-standers, but changes in the value chain can change these actors into primary or secondary stakeholders.

The object of analysis in this study is the value chain. The study focuses therefore mainly on primary and secondary stakeholders. The stakeholder list was drafted by merging lists of stakeholders identified by the project partners. A wide range of stakeholders was included, ranging from charging facility operator to EV component manufacturer to energy distributor. This list was supplemented with stakeholders that were identified by their involvement in the GreenCharge project, participation in previous European projects on the topics of local renewable energy production and smart charging, and by studying the supply chain of the value chain.

A.2 The survey, data and GDPR

This study does not include respondents belonging to the general public (e.g. EV owners/drivers), for approaching and assessing viewpoints of various and diverse socials groups is very challenging. In order to gauge of the public opinion, NGOs (non-governmental organisations) have been approached. NGOs have a feel for fluctuations in the public opinion, represent interest of certain social groups and tend to serve more

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

idealistic values and environmentalism rather than materialistic values. Therefore, NGOs do, to some extent, show society's concerns, provided GreenCharge pilots lead to a commercial scale follow-up.

The data in this study, including survey results, will be handled in line with the D1.1 Data Management Plan.

This survey is GDPR compliant. It is clear why this survey is performed, and how GreenCharge plans to use respondent's data. Respondents must provide a freely given, specific, informed and unambiguous consent for collecting their personal data. If respondents have any questions or change their mind, an e-mail address is provided for respondents to contact. The tool used for data collection, Survey Monkey, is committed to GDPR compliance. SurveyMonkey has several GDPR compliance measures: a data processing agreement for all paid plans containing standard SurveyMonkey Data Processing Agreement with Standard Contractual Clauses/Model Clauses and GDPR clauses as standard, legal updates, and security via state-of-the-art SOC II certified servers in the United States. More information on SurveyMonkey's GDPR compliant features can be found on https://www.surveymonkey.com/mp/gdpr/.

A.3 Set-up, distribution and responses

The questionnaire was distributed to the list of 476 stakeholders previously identified. The first round of questionnaires was distributed through the use of an online survey, mainly disseminated through e-mail and social media campaigns. The second round was conducted during the first Business Model workshops in Oslo, Barcelona, and Bremen. In total, 44 surveys were completed and 17 were partially completed. This indicates a response rate of >10%. For some questions, the partial responses were included, increasing individual question response rate up to 13%. These numbers are, although on the lower side, not unusual for a survey of this type and are therefore regarded satisfactory.

A.4 Background information

A.4.1 Their role in the value chain

Firstly, respondents are asked to indicate their role in the value chain according to Figure 25. By doing so, a comparison between value chains can be made. Some organisations are likely to fulfil different roles throughout different value chains. Respondents were asked to take the survey in the perspective of the role they most often fulfil. Categories A – K encompass primary stakeholders, categories L – O contain secondary stakeholders. Finally, category O will contain mostly tertiary stakeholders. Ideally, this categorization will enable a comparison of characteristics between different categories of stakeholders.

- Question 3 of the questionnaire (see Annex C)

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

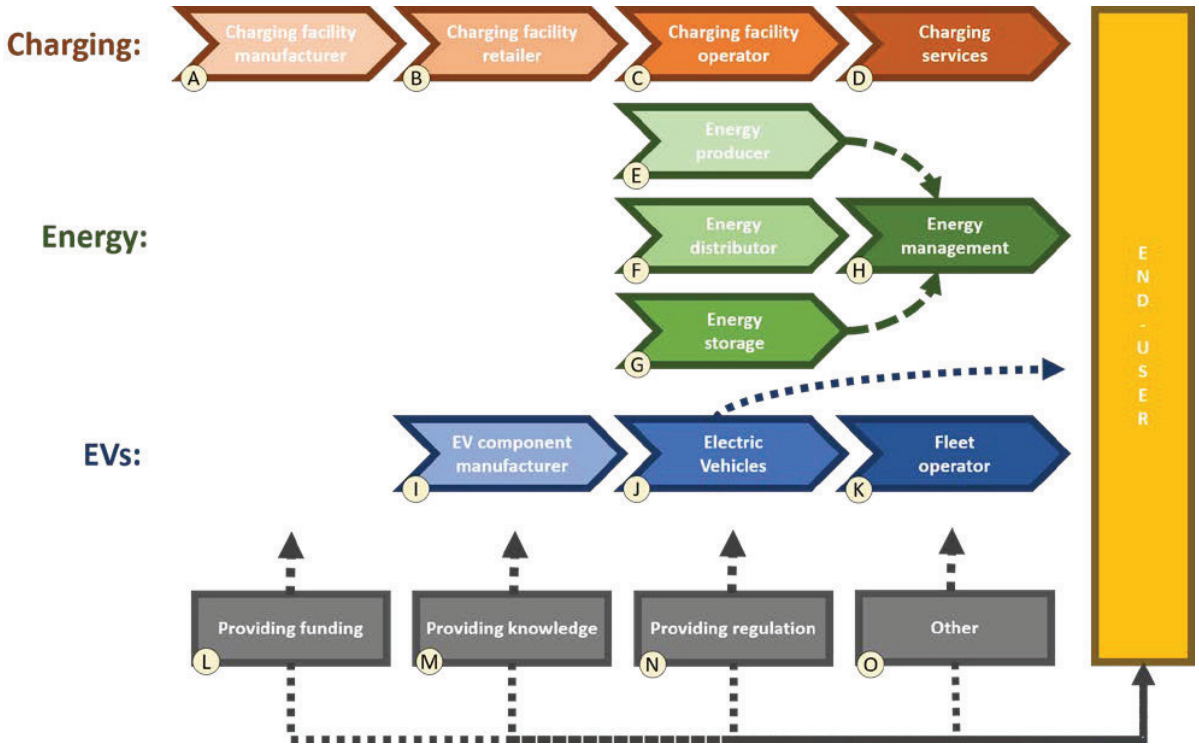


Figure 25: Value chain characterization

A.5 Main stakeholder characteristics

The playing field is mapped by the stakeholders' main characteristics. The characteristics measured by this survey are: knowledge, attitude, and concerns. These characteristics are conceptualized and operationalized in this section.

A.5.1 Knowledge

Knowledge may entail a (theoretical or practical) familiarity, awareness and/or understanding of a phenomenon, which can express itself in facts, information, description or skills. Knowledge by description is gained through study or education and often results in propositional knowledge or explicit knowledge, sometimes it is referred to as "knowledge of truths" or "know-what". Knowledge by acquaintance depends on experience to develop. It involves implicit knowledge of procedures and processes, generally obtained by doing ("know-how"). Both types of knowledge are important. As such, these are both measured in the survey.

This stakeholder characteristic is of importance in this study as actors require knowledge to actually change their organisation towards local renewable energy production and smart charging practices. Therefore, this survey measures stakeholders' knowledge on these subjects.

- Question 10 of the questionnaire (see Annex C)

A.5.2 Attitude

Another important variable to be evaluated is the stakeholders' attitude towards GreenCharge. Often is assumed that an attitude merely entails the way a person feels about a certain topic. However, every well-defined description of attitude includes an aspect that entails the mental position towards, or a way of thinking about, a certain subject. This behavioural aspect is what affects a person's behaviour. Simply put, just having a positive stance towards overcoming barriers inwards the transition to zero emission mobility does not

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

completely describe one's attitude. If this positive stance towards overcoming these barriers were to be combined with actively looking to overcoming them, does.

Attitude is measured by using the semantic differential technique, in which a concept is evaluated on a scale between two bipolar adjectives. It can be constructed to measure an evaluation, potency or activity. In this case, the concepts local renewable energy production and smart charging of EVs are measured by five evaluative adjectives on a 5-point scale.

- Question 6 (local RES), question 7 (Smart charging EVs) of the questionnaire (see Annex A)

A.5.3 Concerns to implementing local renewable energy production and smart charging

At the start of this project, four different focuses have been identified: (1) e-Mobility acceptance, (2) Business Models, (3) Smart Energy Management, (4) Sustainable e-Mobility in cities. Within these focuses, different concerns may arise. In order to validate these concerns from a bottom-up perspective, stakeholders are asked to agree or disagree to the impeding nature of the concerns. In addition, there is one open field to give stakeholders the opportunity to add any concerns they have that are not listed.

- Question 12 of the questionnaire (see Annex C)

A.6 Stakeholder input

Following the main stakeholder characteristics, the second part of the survey is reserved for stakeholder input to the GreenCharge project. The different sections discussed here are: concerns to implementing local renewable energy production and smart charging, influence, and interest.

A.6.1 Collaboration

Collaborations within or between value chains are required to overcome the barriers to the transition towards the transition to zero emission mobility. GreenCharge mobilizes stakeholders to build such collaborations. At the on-set of this endeavour, it is important to gain insight into what kind of collaborations have to be stimulated. Respondents are asked to indicate the current level of collaboration with different types of actors in the value chain, using the same value chain characterization as in question 3. The level of collaboration was measured on a 5-point scale.

- Question 11 of the questionnaire (see Annex C)

A.6.2 Influence

The concept of influence is a broad concept and its definitions vary. The concepts of influence and power are closely related and therefore often associated with one another. Power concerns the potential to control resources and affect decisions, and especially the ability to change the behaviours of others. Influence is a more subtle and indirect concept which mostly concerns emotions or opinions. Generally, it is agreed that power is obtained from specific sources, such as status, whereas influence realise more on persuasive tactics. In this report, influence is the ability of an actor to change or control the behaviour of other actors. In this way, influence (or the lack of it) is a key characteristic of stakeholders. It determines the extent to which a stakeholder has the ability to change the behaviour of other value chain actors. In this study, influence is understood as a property (a stakeholder can rely on certain sources of power) as well as an activity (a stakeholder is actually willing to exert these sources of power to change the behaviour of others). This ability can be based on different sources of power. In this analysis, a distinction is made between five sources of power:

- Legitimate power is derived from a formal role that an organisation holds within the value chain, e.g. the power that can be derived from having a regulatory position,
- Expert power is derived from possessing knowledge in a particular (key) area, e.g. the statements of an organisation with expertise are perceived as more valuable than the statements of other organisations,

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

- Economic power is derived from the financial means that an organisation possesses, e.g. an organisation with large financial means can financially reward (provide order) or punish (withdraw order) other actors in the value chain,
- Positional power is derived from the position that an organisation holds within the value chain, e.g. an organisation acts performs its activities in a crucial step of the value chain,
- Referent power is derived from respect for and the charisma of an organisation, e.g. an organisation with well-known brand has influence because other organisations like to collaborate.

For each of these sources of power, an item was created. Influence is thus measured by respondents' self-evaluation of different types of power on a 5-point scale. Aside from just influence, the willingness to exert this power (activity) is measured by including a question about the different types of activity the stakeholder is engaged in. Once again, this is done on a 5-point scale.

- Question 8 (influence) and question 9 (willingness to exert influence) of the questionnaire (see Annex A)

A.6.3 Interest

The first stakeholder characteristic to be measured in this stakeholder analysis is interest. Interest can be described as the "feeling that makes you want to know or learn more about something or to be involved in something". Assessing interest can be helpful in trying to determine whether stakeholders will be involved in activities that are similar to, or relevant for GreenCharge or any other follow-up projects.

Identifying and assessing the interest of an actor is therefore the first step in a stakeholder analysis. The analysis of this study focuses on stakeholders' interests in change in the value chain. Stakeholder's interest in change is measured by asking for the perceived effect of local renewable energy production and smart charging of EVs on five different aspects of an organisation (e.g. profitability, independency), on a 5-points scale.

- Question 4 and 5 of the questionnaire (see Annex C)

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

B EU Project Analysis

The methodology of the European project analysis will be described in this section. An analysis was made of the number of funded projects over time, type and amount of project partners and amount of funding over time. This was done using WHEESBEE.

B.1 WHEESBEE Tool

WHEESBEE is a Business Intelligence and Tech Mining tool aimed at supporting and stimulating the technological innovation processes of large enterprises, small and medium sized companies, and research centres. WHEESBEE is a one-stop-shop service supporting users in finding, managing, and analysing the relevant information to support research and innovation processes. WHEESBEE is based on the results of two research projects funded by the European Commission (projects "INSEARCH" and "DISCOVER-IT"), coordinated by INNOVATION ENGINEERING and realized in collaboration with several European research centres. In such projects, INNOVATION ENGINEERING developed the concepts of searching technology-related information using Latent Semantic Analysis techniques, as well as using Natural Language Processing to identify patterns within millions of documents, to apply the basic principle of TRIZ (theory of inventive problem solving). The WHEESBEE tool uses several public data sources, such as CORDIS.

By using the WHEESBEE tool, the stakeholder analysis focuses on the European organisations that have been working on projects on the topic of local renewable energy production or smart charging EVs. As these projects have a strong innovation character, their stakeholders represent “the Innovators” in Europe in the field of local renewable energy production and smart charging. Analysis of the aforementioned projects led to the identification on one hand, of the industrial entities (large industries and SMEs) with interest in the field of local renewable energy production and smart charging for their businesses, and on the other hand, of the RTOs and academic organisations active in the development of techniques regarding local renewable energy production and smart charging. The following section provides a detailed description of the methodology implemented to identify those innovators in Europe that are interested in local renewable energy production and smart charging.

The scope has been defined through the value chain in Figure 25. The adopted timespan starts in the same year as the Horizon 2020 program did. Horizon 2020 has made funding available from 2014. Therefore, the timespan is from 2014 until now. As such, some late FP7 projects may be amongst the results. These projects are considered relevant, for they started within 5 years of this study and are therefore not outdated. Projects before 2014 might be outdated, as the market of local renewable energy production and smart charging market is a rapidly changing and very dynamic.

The following sections describe the steps that were taken in each topic in order to filter the results and select relevant projects. The keywords were used with a combination of different search (Boolean) operators (quotation marks, AND) in order to specify the results. Many projects were returned by more than one keyword. For that reason, it was impossible to categorize the project according to search terms. Therefore, all results were aggregated, and duplicates were removed. The accuracy of this method was verified by checking a sample of the excluded projects.

B.1.1 Charging value chain keywords

In Table 14, the keywords used in the Charging value chain study are displayed.

Table 14: Keywords used in Charging value chain study

Charging infrastructure	*Roaming management*
Charging management	*Booking system*
Bidirectional charging	*Billing system*
Charging scheduling	*Battery management*
Regulations	*Norms*

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

The remaining results were manually selected by applying the selection criteria described in sections B.1.4 Selection criteria. After selection, 449 projects remained.

B.1.2 Energy value chain keywords

In Table 15, the keywords used in the Charging value chain study are displayed.

Table 15: Keywords used in Energy value chain study

Local energy	*Smart city*
Renewable energy source	*Energy management*
Prosumer	*Energy storage*
PV energy	*Regulations*
Smart grid	*Norms*

The remaining results were manually selected by applying the selection criteria described in section B.1.4 Selection criteria. After selection, 883 projects remained.

B.1.3 Electric vehicle value chain keywords

In Table 16, the keywords used in the Charging value chain study are displayed.

Table 16: Keywords used in Electric vehicle value chain study

Vehicle sharing	*Smart mobility*
Car sharing	*Intermodal (e-)mobility*
Sharing economy	*Multimodal (e-)mobility*
Fleet management	*Mobility on demand*
Electric vehicles	*SUMP*
E-mobility	*MaaS (Mobility as a Service)*
Regulations	*Norms*

The remaining results were manually selected by applying the selection criteria described in section B.1.4 Selection criteria. After selection, 557 projects remained.

B.1.4 Selection criteria

For all value chains, the following selection criteria were applied:

- Projects on the topic of local renewable energy production or smart charging, including one of the value chains as a case study,
- Project focused on the following topics:
  - Prosumer,
  - Smart grids, smart cities or SUMPs,
  - Energy systems networks or Neighbourhood energy management systems,
  - Charging infrastructure,
  - Charging services,
  - Battery management/energy management or energy storage, but only if relatable to local production or smart charging,
  - Vehicle or car-sharing and e-Mobility.
- Projects on data collection, knowledge dissemination and integration on any of the topics mentioned above.

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

C Full questionnaire

Welcome to the GreenCharge survey!

Thank you for taking part in this survey. This survey is part of stakeholder analysis performed in the context of the Horizon2020 GreenCharge project. This project aims to convincingly demonstrate how technological solutions and associated business models can be integrated and deployed to overcome barriers in widescale adoption of EVs. This will be achieved by focussing on two topics: (1) local Renewable Energy Source (RES) production, and (2) smart charging of EVs.

It is essential that this agenda is supported by different types of stakeholders, including local, regional and national governments, roaming providers, manufacturers of Electric Vehicles and their batteries, housing associations, real estate developers, charging infrastructure manufacturers and operators, (local) renewable energy sources, technology developers/providers, grid operators, local business, EV drivers and owners and many more. For this reason, we will be gathering your thoughts and opinions on the future of European mobility in this survey.

This survey will take approximately 10 minutes. By answering the questions in this survey, you agree to take part in it. Responses will remain anonymous.

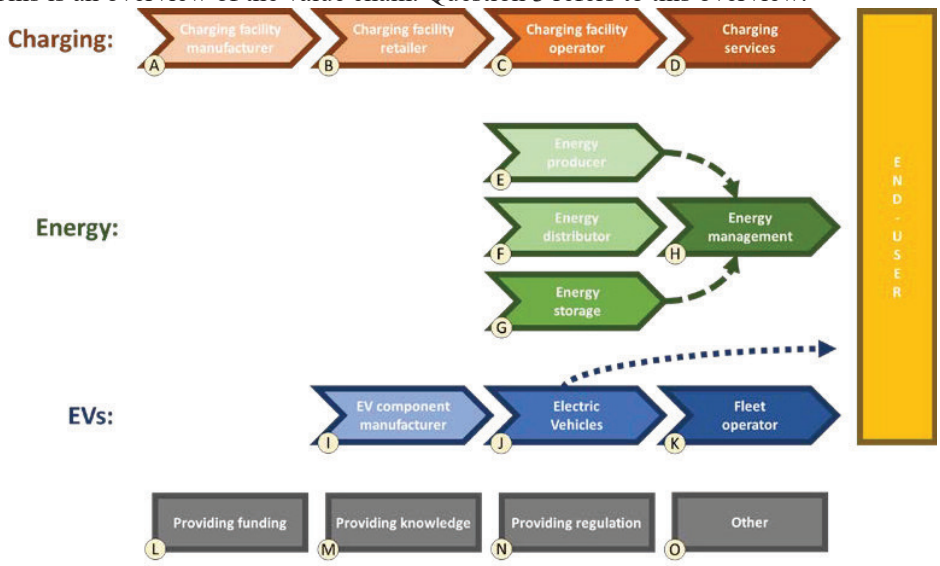
---

1) My organisation is a:

- o Company – SME
- o Company – Large
- o University/Research organisation
- o Governmental organisation
- o Non-profit organisation
- o Other – (please specify): _____

2) My organisation is based in the following country: _____

This is an overview of the value chain. Question 3 refers to this overview.



The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

3) My organisation is predominantly active in the following phase of the value chain:

- **A** – Charging facility manufacturer
- **B** – Charging facility retailer
- **C** – Charging facility operator
- **D** – Charging services
- **E** – Energy producer
- **F** – Energy distributor
- **G** – Energy storage
- **O** – Other (please specify):

  _____
- **H** – Energy management
- **I** – EV component manufacturer
- **J** – Electric vehicles
- **K** – Fleet operator
- **L** – Providing funding
- **M** – Providing knowledge
- **N** – Providing regulation

In the next sections of this survey, the terms 'Local renewable energy production' and 'Smart Charging' are used.

'Local renewable energy production' refers to the local production of energy from Renewable Energy Sources. An example might be a solar PV panel.

'Smart Charging' makes it possible to have electric cars charge automatically at times when the electricity grid is not so heavily used, without the driver noticing. Smart charging distributes the available load capacity without affecting car owners.

4) Please indicate the extent to which you agree with the following statements:
Local renewable energy production would have a positive influence on:

	Strongly disagree	2	3	4	Strongly agree
…the market share of my organisation					
…the profitability of my organisation					
…the independency of my organisation					
…the societal legitimacy (public image) of my organisation					
…the network of my organisation					

5) Please indicate the extent to which you agree with the following statements:
Smart charging would have a positive influence on:

	Strongly disagree	2	3	4	Strongly agree
…the market share of my organisation					

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

…the profitability of my organisation					
…the independency of my organisation					
…the societal legitimacy (public image) of my organisation					
…the network of my organisation					

---

6) Please indicate the extent to which you agree with the following statements:
Local renewable energy production is…

	Strongly disagree	2	3	4	Strongly agree
…feasible					
…desirable					
…necessary					
…important					
…appealing					

7) Please indicate the extent to which you agree with the following statements:
Smart charging EVs is…

	Strongly disagree	2	3	4	Strongly agree
…feasible					
…desirable					
…necessary					
…important					
…appealing					

In this survey, we define the 'value chain' as the economic process from raw material to consumer or user. The value chain is a network of organisations, people and activities that exchange information and / or products.

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

8) Please indicate the extent to which you agree with the following statements:

In the value chain, my organisation has…

	Strongly disagree	2	3	4	Strongly agree
…a large market share					
…influence on regulatory issues					
…a large network					
…visibility as a value chain front-runner					
…highly valued knowledge and information of the value chain					

9) **Please indicate how often your organisation participates in**

	Strongly disagree	2	3	4	Strongly agree
…dialogues with other organisations					
…collaborations with other organisations					
…collaborative research projects with other organisations					
…platform organisations					
…lobbying activities					

In the next question, Energy Smart Neighbourhoods are mentioned. These are defined as: "An Energy Smart Neighbourhood (ESN) is a neighbourhood whose energy use is managed in a coordinated way. In the GreenCharge context, the energy use in an ESN is coordinated with local renewable energy production and the use of storage including batteries of parked and connected EVs."

10) Please indicate the level of expertise in your organisation on the following aspects:

	No level	2	3	4	High level
Charging facilities					
Car-sharing					
Local Renewable Energy Source (RES) production					

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

Energy storage					
Smart Energy Management					
Charging booking services					
Charging billing services					
Energy grids					
Sustainable Urban Mobility Plans (SUMPS)					
Energy Smart Neighbourhoods (ESNs)*					

11) Please indicate how often your organisation collaborates with the following * organisation

	Never	2	3	4	Very often
A – Charging facility manufacturer					
B – Charging facility retailer					
C – Charging facility operator					
D – Charging services					
E – Energy producer					
F – Energy distributor					
G – Energy storage					
H – Energy management					
I – EV component manufacturer					
J – Electric vehicles					
K – Fleet operator					
L – Providing funding					
M – Providing knowledge					
N – Providing regulation					
O – Other (please specify): _____					

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

12) Please indicate the extent to which the following aspects are concerns for your organisation

	No concern	2	3	4	High concern
Charging accessibility (anyone, anywhere)					
Charging availability (as and when you need it)					
Charging costs					
Integration (eMobility core part of transport system)					
Fairness (all actors perceive benefits)					
Viability (match between costs, profitability and willingness to pay)					
Charging infrastructure investment (viable return on investment)					
Charging infrastructure utilisation (busy but not overbooked)					
Multi-actor provision (eRoaming of booking & payment)					
Effective use of local RES					
Avoidance of peak loads					
Other (please specify): _____					

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

Members of the GreenCharge consortium

SINTEF	SINTEF AS (SINTEF) NO-7465 Trondheim Norway www.sintef.com	**Project Coordinator:** Joe Gorman Joe.Gorman@sintef.no **Technical Manager:** Shanshan Jiang Shanshan.Jiang@sintef.no
eSmart Systems	eSmart Systems AS (ESMART) NO-1783 Halden Norway www.esmartsystems.com	**Contact:** Frida Sund frida.sund@esmartsystems.com
HUBJECT	Hubject GmbH (HUBJ) DE-10829 Berlin Germany www.hubject.com	**Innovation Manager:** Sonja Pajkovska sonja.pajkovska@hubject.com
eurecat Centre Tecnològic de Catalunya	Fundacio Eurecat (EUT) ES-08290 Barcelona Spain www.eurecat.org	**Contact:** Regina Enrich regina.enrich@eurecat.org
ATLANTIS TRACKING YOUR WORLD	Atlantis IT S.L.U. (ATLAN) ES-08013 Barcelona Spain www.atlantisit.eu	**Contact:** Ricard Soler rsoler@atlantis-technology.com
enchufing	Millot Energy Solutions SL (ENCH) ES-08223 Terassa Spain www.millorbattery.com	**Contact:** Gerard Barris gbarris@enchufing.com
motit www.motitworld.com	Motit World SL (MOTIT) ES-28037 Madrid Spain www.motitworld.com	**Contact:** Valentin Porta valentin.porta@goinggreen.es
Freie Hansestadt Bremen	Freie Hansestadt Bremen (BREMEN) DE-28195 Bremen Germany	**Contact:** Michael Glotz-Richter michael.glotz-richter@umwelt.bremen.de

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.

MOVE ABOUT Zero Hassle – Zero Emissions	Move About GmbH (MOVA) DE-28359 Bremen Germany www.move-about.de	**Contact:** Nils Jakubowski nils.jakubowski@move-about.de
pmc personal mobility center	Personal Mobility Center Nordwest eG (PMC) DE-28359 Bremen Germany www.pmc-nordwest.de	**Contact:** Bernd Günther b.guenther@pmc-nordwest.de
	Oslo kommune (OSLO) NO-0037 Oslo Norway www.oslo.kommune.no	**Contact:** Sture Portvik sture.portvik@bym.oslo.kommune.no
fortum	Fortum OYJ (FORTUM) FI-02150 Espoo Finland www.fortum.com	**Contact:** Jan Ihle jan.haugen@fortum.com
PNO Connecting Ambitions	PNO Consultants BV (PNO) NL.2289 DC Rijswijk Netherlands www.pnoconsultants.com	**Contact:** Arno Schoevaars arno.schoevaars@pnoconsultants.com
UNIVERSITÀ DEGLI STUDI DELLA CAMPANIA LUIGI VANVITELLI SCUOLA POLITECNICA E DELLE SCIENZE DI BASE DIPARTIMENTO DI INGEGNERIA INDUSTRIALE E DELL'INFORMAZIONE	Universita Deglo Studi Della Campania Luigi Vanvitelli (SUN) IT-81100 Caserta Italy www.unicampania.it	**Contact:** Salvatore Venticinque salvatore.venticinque@unina2.it
UiO : Universitetet i Oslo	University of Oslo (UiO) NO-0313 Oslo Norway www.uio.no	**Contact:** Geir Horn geir.horn@mn.uio.no
ICLEI Local Governments for Sustainability	ICLEI European Secretariat GmbH (ICLEI) DE-79098 Freiburg Germany www.iclei-europe.org	**Contact:** Stefan Kuhn stefan.kuhn@iclei.org

The research leading to these results has received funding from Horizon 2020, the European Union's Framework Programme for Research and Innovation (H2020) under grant agreement n° 769016.