

Vision and Roadmap of the National Electric Mobility Platform



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Category: Vehicle engineering

Attractive, reliable electric vehicles are available | Business models have been established for the second life of the battery (Ensuring a high salvage value for car batteries through re-use and recycling)



Category: Energy and the environment

Electric mobility uses only "green energy" | Special charging tariffs promote electric mobility | The electric vehicle is part of "smart grid" and "smart home." | As an energy storage device, the battery stabilizes the power grid



Category: Charging infrastructure

Guaranteed open access to charging infrastructure | Charging infrastructure has been set up that meets demand – taking into account population and car density | Charging infrastructure is reliable, compatible, and easy to use | DC fast-charging stations (CCS standard) are available | Straightforward, private use of company cars in terms of charging and billing | Electric vehicles can be charged in different countries | Inductive charging has been technically established and is visible on the market | Innovative solutions and business models are on the market



Category: Urban planning and intermodality

Electric mobility is included in traffic and urban planning and in traffic regulations | Park and ride stations have been set up to accommodate electric vehicles | Electric vehicles are part of intermodal transportation in urban areas with high population density | Electric vehicles are a standard part of carsharing fleets | New usage models have been established for electric vehicles



Basics:

Standardisation



Training and qualifications



Information and communication technology



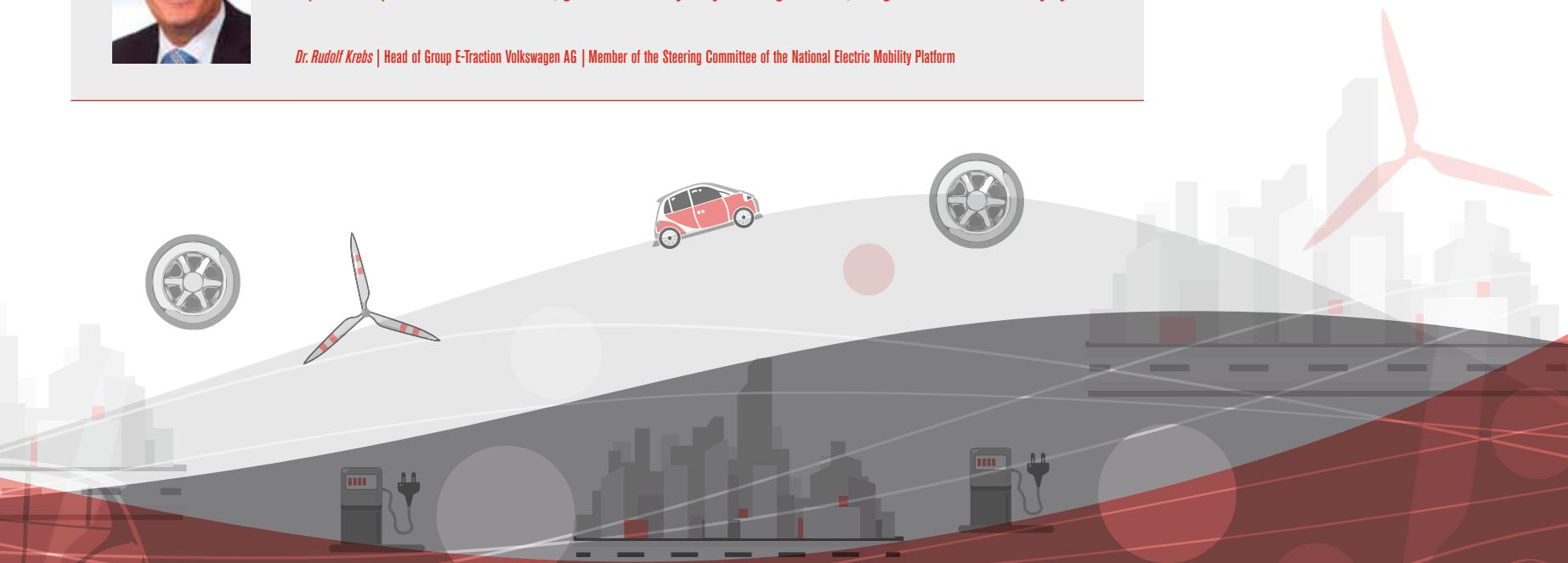
"Looking ahead to the start of the market ramp-up phase in 2015, it will be critical to the success of this initiative to ensure that all the different themes – from vehicle technology, energy and charging infrastructure to urban planning – are embedded in a user-oriented overall system. The Systemic Approach Roadmap provides us with the tool we need to do this. We now need to start working methodically on the themes identified in the roadmap."

Prof. Henning Kagermann | President of acatech – National Academy of Science and Engineering | Chairman of the National Electric Mobility Platform



"In 2012, the National Electric Mobility Platform set itself the challenge of using the Systemic Approach to bring together all the work carried out up to that point so that an overall picture could be created. Policymakers, industry and civil society have worked together to formulate our Vision 2020. The new roadmap is the outcome of a partnership between all the actors, geared towards jointly creating a robust, integrated electric mobility system."

Dr. Rudolf Krebs | Head of Group E-Traction Volkswagen AG | Member of the Steering Committee of the National Electric Mobility Platform





Vision 2020

In 2020, there is a viable complete electric mobility system that has been widely accepted by society, that meets specific transportation needs (passenger and commercial) with a high level of availability and reliability, and that puts technically advanced, profitable products on the market. Electric mobility has become one of the keys to environmentally sustainable transport. The focus is on the user.

In 2020, electric vehicles are a common sight on our roads. Those who use them are seen as progressive and environmentally conscious, yet still enthusiasts, in a positive sense, for car engineering and driving.

Electric vehicles are an economically attractive and future-proof option for larger user groups. There are practical, profitable business models that create a sustainable, market-oriented, dynamic environment for electric mobility.

The foundation for this, in particular, are the diverse, customer-oriented information and communication technology solutions. Comprehensive training and qualifications ensure that the personnel employed are highly skilled.

The Systemic Approach Roadmap

The National Electric Mobility Platform

"Electric mobility made in Germany" stands for systemic and sustainable solutions that cross the boundaries of traditional industries. This fundamental principle, which was formulated in the 3rd Report of The German National Platform for Electric Mobility (Nationale Plattform Elektromobilität – NPE) in May 2012, encapsulates the approach shared by all the actors involved in electric mobility in Germany, which is geared towards.

The development of an integrated electric mobility system with the user at the centre.

The NPE consists of seven working groups made up of top-level experts that address themes ranging from drive technologies and charging infrastructure development to the creation of an overall framework. From the outset, the working groups have sought to promote a cross-sectoral debate that also includes actors from right across the political spectrum. Meanwhile, they also continue to address the key technical and technological issues. The guidelines for their common work are laid down by the Platform's Steering Committee which is chaired by Professor Kagermann.

In the autumn of 2012, the members of the Platform took the joint decision to take the results of the working groups to the next level by bringing together the individual workstreams in order to paint a coherent overall picture.

To this end, the existing NPE structure was supplemented by the establishment of the "Systemic Approach" working group. In view of the cross-cutting nature of the new group's work, it recruited members from the established working groups, together with a number of additional experts. Its goal was to develop a concise shared vision of electric mobility in the year 2020 and to formulate a roadmap describing the stages involved in the implementation of this vision.

This roadmap outlines the areas where joint action by industry, policy-makers and civil society will be required in order to support a successful market ramp-up.

The Systemic Approach Roadmap is based on four thematic areas that represent the key interfaces between the NPE's working groups. The four themes are "Vehicle Technology", "Energy & Environment", "Charging Infrastructure" and "Urban Planning & Intermodality". Priority areas for action were jointly formulated for each of these thematic areas.

Thematic areas

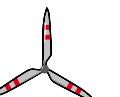
"Vehicle Technology"

The "Vehicle Technology" thematic area is focused on how to market a product that is both environmentally and financially attractive. Customers using an electric vehicle should not experience any limitations compared to conventional vehicles. In addition, it will be necessary to develop robust business models that pay particular attention to the "second life" of electric vehicle batteries. The NPE believes that this will be a key enabler for achieving a sustainable reduction in the cost of electric vehicles.



"Energy & Environment"

The "Energy & Environment" thematic area is especially focused on the use of additional renewable energy for powering electric mobility. Electric vehicles are viewed as an integral part of the overall system and can even contribute to the transition to sustainable energy by helping to stabilise the electricity grid. This will require electric mobility to be integrated into smart home and smart grid concepts, together with special tariff structures for charging electric vehicles.



"Charging Infrastructure"

The "Charging Infrastructure" thematic area addresses the construction and expansion of public, semi-public and private charging infrastructure. This includes both standard AC charging infrastructure and DC fast charging infrastructure (based on the CCS standard). The key enablers are open-system access and guaranteed charging infrastructure reliability and compatibility. Anyone should be able to use any charging station to charge their vehicle without any problems or restrictions. It will also be important to address international charging and roaming solutions from an early stage. Finally, in order to deliver a self-sustaining charging infrastructure, new and financially attractive operator models will need to be developed.



"Urban Planning & Intermodality"

The "Urban Planning & Intermodality" thematic area encompasses a wide range of topics centred around the urban planning aspects of electric mobility. In particular, it addresses a variety of issues relating to intermodality, for example car sharing or the linkages between individual mobility and local public transport (LPT). In order to deliver the relevant goals, it will be necessary not only to resolve a number of legal questions but also to achieve wide-ranging support, particularly from the business community, for developing new and innovative concepts and implementing them over the long term.



Priority areas for action

This brochure presents both the joint roadmap and the priority areas for action identified in the roadmap. These action areas were formulated jointly by the members of the NPE. Work on them will need to begin in 2013/14 in order to ensure that the shared vision is delivered. The responsible NPE working groups will ensure prompt implementation.

Basics

Training & Qualification, Standardisation and Information and Communication Technology (ICT) are key underlying enablers of every aspect of the Systemic Approach.

Training & Qualification is particularly focused on vocational and academic education. The training methods used in the relevant training courses provide a valuable basis for teaching different aspects of the Systemic Approach. The Systemic Approach requires closer cooperation between different academic departments, modifications to study course content and the inclusion of academic disciplines that have not been involved hitherto. Consequently, a separate Training & Qualification roadmap has been drawn up. It will also be especially important to enhance post-graduate continuing professional development in order to bring the technical and process knowledge of experienced professionals into line with the new requirements. International networking of training and qualification is another key aspect.

As a key underlying enabler, especially of the technological challenges connected with electric mobility, standardisation has already been incorporated into the individual thematic areas and is being worked on in parallel by the different working groups.

The other key enabler is information and communication technology (ICT). This will play a central role in the implementation and interconnection of the integrated electric mobility system, particularly with regard to the harmonisation and simplification of charging and billing processes and with regard to intermodal transport services. The NPE's Steering Committee therefore decided to create a sub-working group to deal exclusively with ICT-related matters.

Next steps

The Systemic Approach working group formulated the roadmap presented in this document on behalf of the NPE. The roadmap highlights the key interfaces between the NPE's working groups. Moreover, by formulating and prioritising the relevant areas for action, it outlines the steps that need to be taken in order to establish an integrated electric mobility system. A review and the initial outcomes of the measures taken to meet the needs outlined in this roadmap will be included in the 4th NPE report in 2014.



Systemic Approach Roadmap

Roadmap key



Activities that are necessary in order to deliver the goals



Activities already initiated by industry/policymakers



Areas where action should be prioritised in 2013/14 in order to ensure a successful market ramp-up



WG x Addressed in NPE WG "x"

Activities that are addressed and being worked on by the NPE's working groups and sub-working groups



Showcase/development project

Activities addressed by showcase/development projects

Roadmap

Thematic area Vehicle Technology



2014

2017

2020

Vision

Sub-category						
Communication interface	Communication standards	WG 4				
Drives	Large-scale processes for producing discrete components	WG 1/2	Integrated solutions and modular drive toolkits available	WG 1/2	Highly integrated, modular powertrain solutions	WG 1/2
Energy storage and management	Inductive charging technically feasible	WG 1/3/4	Inductive charging available as optional extra for BEVs and PHEVs in isolated applications	WG 1/3/4	Interoperable inductive charging solutions	WG 1/3/4
	AC and DC charging with Combined Charging System (CCS)	WG 1/2/3/4	Optimised DC charging capacity for CCS energy storage devices	WG 1/2/3	Determine market potential of used batteries	WG 2/5
	Fed back into recycling processes	WG 2/5	Estimation of residual value of batteries	WG 2/5	Know-How re. causes and costs of wear and tear in Vehicle to Grid	WG 2
	Safety at high voltages for vehicles with high voltage energy storage systems	WG 1/2/4/7	Safety standards for transport of lithium-ion batteries	WG 2/5		

Key:

Ongoing activities

Priority areas for action

WG x Addressed in NPE WG "x"

Showcase/development project

Thematic area Energy & Environment



2014

2017

2020

Vision

Sub-category						
Acceptance	Clarify tax and energy law issues	WG 3/7				
	Green electricity products from public charging infrastructure	WG 3	Synchronisation of electric mobility business processes	WG 3		
	Charge metering	WG 3/4				
	Green electricity supply in commercial sector	WG 3	Incentives for vehicle owners to use energy that they have produced themselves to power their electric vehicles	WG 2/3/7		
	Employers provide charging electricity	WG 3	Quality seal for CO ₂ -neutral logistics	WG 7		
Costs	Tax law: treatment of vehicle charging at the workplace as non-cash benefit	WG 7	Supply grid incentives (for smart grid applications)	WG 2/3	Tariffs and services that benefit customers	WG 2/3
			Treatment of electric vehicles in energy legislation	WG 2/3/7	Vehicle to Grid: Take advantage of the flexible way that electric vehicles can be charged	WG 2/3
Load management	Prototype load management systems implemented in R&D environment	WG 3/4/7	Treatment of the taxation of variable production and consumption units in energy industry law	WG 3	Controlled charging processes implemented in standard software for energy providers	WG 3
	Ability to forecast when vehicles charged/check local grid load	WG 2/3	Framework for smart energy management in smart homes	WG 2/3/7	Legal framework checked for balancing energy tenders	WG 3
			Availability of smart energy management in smart homes	WG 2/3/7		

Key:

Ongoing activities

Priority areas for action

WG x Addressed in NPE WG "x"

Showcase/development project

Roadmap

Thematic area Charging Infrastructure (1/2)



2014

2017

2020

Vision

Sub-category

Standardisation

Interoperable charging infrastructure

Smart grid standards adapted

WG 4

Smart grid standards are the market standard

Market standards for communication between vehicles and charging stations

WG 3/4

WG 3/4

Consensus on end customer contract IDs and charging station IDs

WG 4

Communication standards between IT back end (providers) and clearing houses

WG 3/4

Establishment of communication standards between IT back end (providers) and clearing houses

WG 3/4

- Open-system access to charging infrastructure
- Charging infrastructure capable of meeting demand, based on population and vehicle density

- Charging infrastructure is reliable, compatible and easy to operate

- Basic DC fast charging station coverage guaranteed

Regulatory framework

Open-system charging possible using public charging infrastructure

WG 3/7

Construction and expansion of public charging infrastructure (AC und DC)

WG 3/7

Thematic area Charging Infrastructure (2/2)



2014

2017

2020

Vision

Sub-category

Comfort / access

Reservation of parking spaces/charging stations technically feasible

WG 3/7

Reservation of parking spaces/charging stations organically feasible

WG 3/7

Open-system access to charging infrastructure: connectors/mechanical components, authentication, payment systems

WG 3/4

Semi-public charging infrastructure built in association with shared services

- Easy use of electric company cars for private purposes in terms of charging and billing

International roaming solutions for charging

WG 3/7

Inductive charging already in use in some places

WG 3

Roaming platforms provide networked charging infrastructure

WG 3/4

WG 3/4

Data security and data protection law issues

WG 3/4/7

ICT links for location, availability and billing of electric vehicles

WG 3/4

WG 3/4

- Electric vehicles can also be charged when travelling abroad
- The technology for inductive charging is well-established
- There are a number of innovative strategies and business models on the market

Key:

Ongoing activities

Priority areas for action

WG x Addressed in NPE WG "x"

★ Showcase/development project

Key:

Ongoing activities

Priority areas for action

WG x Addressed in NPE WG "x"

★ Showcase/development project

Roadmap**Thematic area
Urban Planning &
Intermodality (1/2)****2014****2017****2020****Vision****Sub-category**

Urban planning	Employers provide sufficient parking spaces for employees who own electric vehicles	WG 7	<ul style="list-style-type: none"> • Electric mobility is taken into account in transport and urban planning measures • Park & Rides have enhanced facilities for electric vehicles
	Availability of parking spaces for electric vehicles from car sharing schemes	WG 7	
	Concepts for special regulations for electric vehicles	WG 7	
	Construction and expansion of Park & Ride facilities with charging infrastructure and connections to LPT	WG 3/7	
	Charging infrastructure construction taken into account in urban planning initiatives	WG 7	
	Aspects requiring high levels of investment taken into account in architectural initiatives	WG 7	
	Sanctions for unauthorised use of parking spaces	WG 7	
	Strategies for promoting semi-public charging infrastructure taken into account	WG 3/7	
	Strategy regarding number and distribution of charging stations in towns and municipalities	WG 3/7	

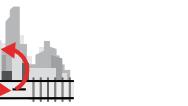
Key:

Ongoing activities

Priority areas for action

WG x Addressed in NPE WG "x"

★ Showcase/development project

**Thematic area
Urban Planning &
Intermodality (2/2)****2014****2017****2020****Vision****Sub-category**

Park & Rides	P&R facilities coordinated with LPT	★	<ul style="list-style-type: none"> • Electric vehicles form part of an intermodal transport system • Electric vehicles routinely form part of car sharing fleets • New usage models have become established for electric vehicles
	Incentives for shared services in connection with charging infrastructure	WG 7	
	"Park at my house" facilities available at key interchanges	WG 7	
	Charging station services	★	
	Free-floating services for electric vehicles	★	
	Charging infrastructure compatibility with free-floating services	WG 7	
	Combined car hire services: electric vehicles and conventional cars/vans	★	
	Adequate state of charge (SOC) for electric vehicle batteries in order to ensure safe continued operation/journey to charging station	★	
	Mobility map	★	
	Interoperability of car sharing fleets and the transport systems they connect with	WG 3/4/7	

Key:

Ongoing activities

Priority areas for action

WG x Addressed in NPE WG "x"

★ Showcase/development project

Priority areas for action



Roadmap

Underlying Enabler: Training & Qualification

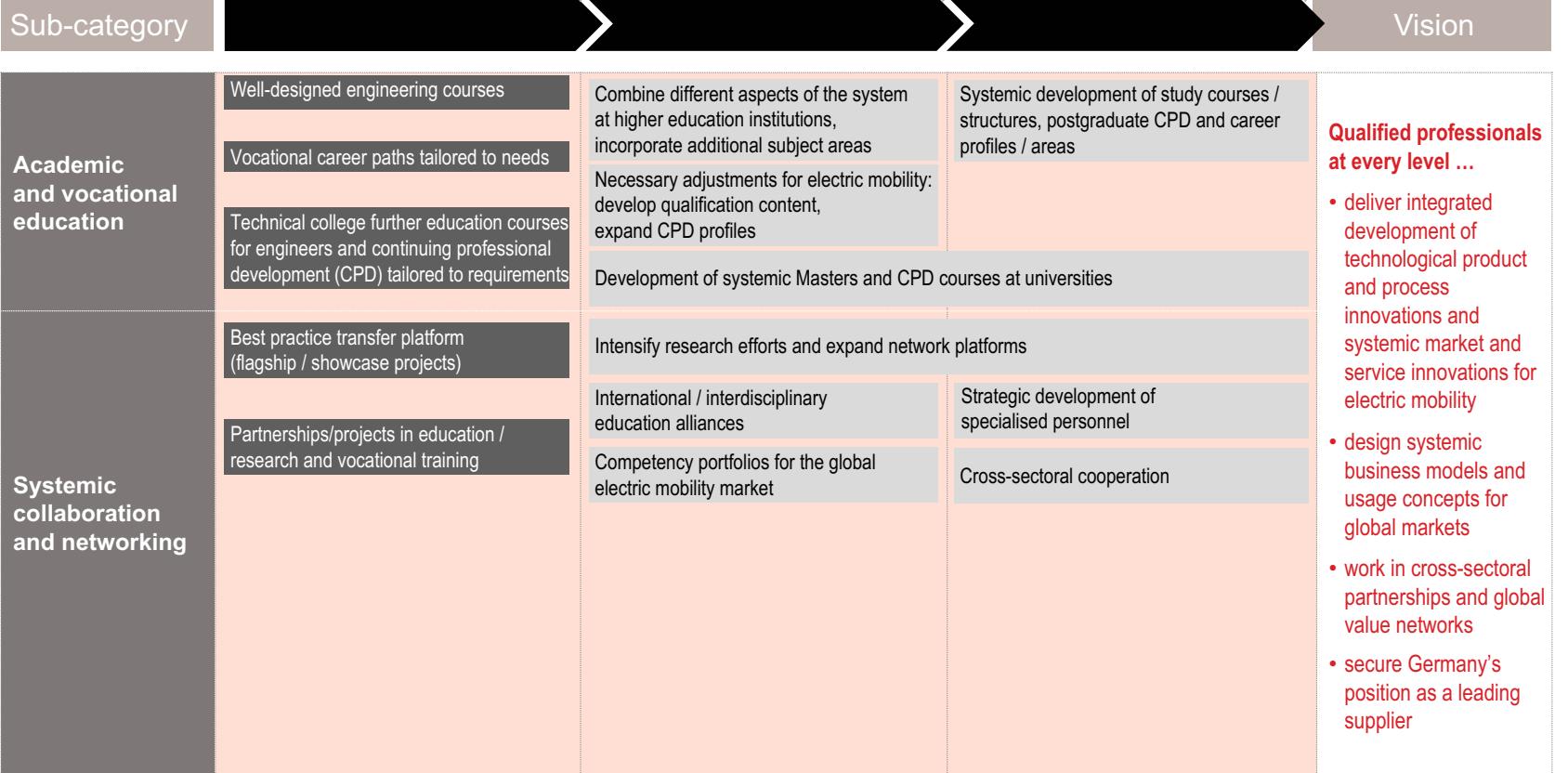


2014

2017

2020

Vision



Key:

Ongoing activities /
NPE WG 6 Competency Roadmap

Vehicle Technology: AC and DC charging using the Combined Charging System (CCS)

Responsible working groups:

WG1 "Drive technologies & vehicle integration",

WG2 "Batteries",

WG3 "Charging infrastructure and power grid integration",

WG4 "Regulation, standardisation and certification"

Working group status and required next steps:

WG1 "Drive technologies and vehicle integration"

- CCS technology is already incorporated into the development roadmaps for the forthcoming electric vehicle ranges of German manufacturers. Vehicle manufacturers and suppliers are working to ensure that future vehicle models are compatible with CCS technology

WG2 "Batteries"

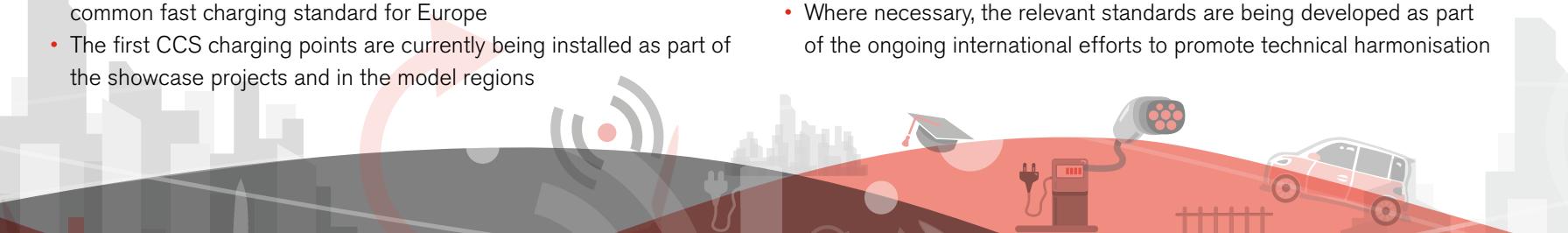
- The way that batteries operate continues to be analysed through ongoing research into the effect of CCS technology on battery life

WG3 "Charging infrastructure and power grid integration"

- User behaviour is being analysed in the showcase projects in order to project actual demand for CCS fast charging stations and other charging methods such as on-street charging
- The suitability of CCS fast charging stations for city centres where extensive parking management measures are in force is currently being investigated in order to ascertain, for example, the extent to which CCS fast charging stations should be installed in public locations over the medium term
- The potential for optimising the design and cost of CCS charging station hardware is being studied
- CCS charging stations form an integral part of the Charging Infrastructure Roadmap

WG4 "Regulation, standardisation and certification"

- Where necessary, the relevant standards are being developed as part of the ongoing international efforts to promote technical harmonisation



Energy & Environment: resolving energy and tax law issues

Responsible working groups:

WG3 "Charging infrastructure and power grid integration",
WG7 "General framework"

Description:

- Energy industry law currently treats charging stations sited on private property or in private multi-storey car parks as customer systems and not as part of the electricity grid. The exact classification of customer systems requires legal clarification
- A more precise legal classification of public and semi-public charging stations is also required

Status:

- There is currently some debate as to whether public charging points should be incorporated into the power supply grid, especially since the flexible way in which electric vehicles can be charged in private settings can have a stabilising influence on the grid. The vast majority (approx. 90%) of charges will be performed in private settings where vehicles can be charged flexibly, thus contributing to the stability of the grid. In public settings, on the other hand, charging flexibility is severely constrained by the customer's need to be able to use their vehicle again as soon as possible and the operator's desire to ensure the highest possible utilisation of their charging infrastructure
- Meter installation and meter reading transparency are currently in the hands of charging station operators. However, operating an AC charging station in accordance with the relevant calibration regulations involves a substantial additional cost, whilst the DC charging infrastructure and inductive charging are still completely unregulated in this regard. One alternative solution could be the use of "smart charging cables" with built-in metering and measuring technology
- Different legal frameworks currently still exist for transport providers and electricity suppliers, meaning that the roles of vendors of charging

electricity remain unclear

- The issues relating to the sharing of information between charging points and vehicles (contract IDs, consumption and output values, charging time and charging status) have been resolved

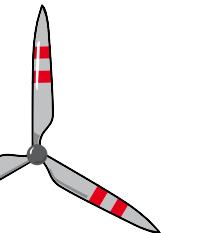
Working group status and required next steps:

WG3 "Charging infrastructure and power grid integration"

- National and international guidelines are being analysed in order to establish the technical requirements for metering and billing solutions
- In order to protect operators' investments, modular end metering device systems are being developed where the calibrated metering devices are kept separate from the other functional units
- Software update mechanisms are being developed that do not temporarily invalidate the meter's calibration certificate or require it to be re-certified
- Mobile metering (i.e. the use of smart charging cables) could provide an alternative stationary charging method. It will be necessary to demonstrate the regulatory compliance of this approach in the various projects and in cooperation with the grid operators

WG7 "General framework"

- Work is ongoing to establish whether charging points should be classified as a customer system under energy industry law, as a part of the electricity grid or as a new class of energy system
- Regulators are currently deciding on where the burden of proof lies in the event of billing errors associated with roaming and customers' freedom to choose their supplier
- Work is ongoing with officials from the Federal Network Agency for Electricity, Gas, Telecommunications, Post and Railway (Bundesnetzagentur) and Germany's National Metrology Institute (Physikalisch-Technische Bundesanstalt) to develop exclusively time-based tariff models in view of the calibration regulation requirements



Charging Infrastructure, Urban Planning & Intermodality: Construction and expansion of public charging infrastructure & incorporation of charging infrastructure construction into urban planning initiatives

Responsible working groups:

WG3 "Charging infrastructure and power grid integration",
WG7 "General framework"

Description:

- Charging facilities in people's homes need to be supplemented by public and semi-public charging points (e.g. in the workplace or in retail outlet car parks) in order to guarantee the necessary flexibility for commuters and people undertaking long journeys of significantly more than 100 km

Status:

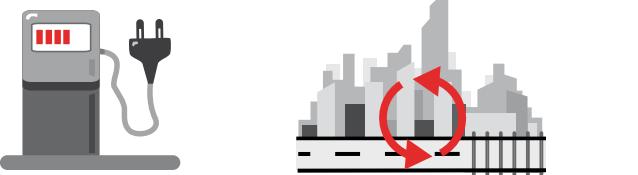
- Existing analysis tools have been used to establish the initial requirements in terms of the charging infrastructure's size and design, taking urban planning considerations into account
- At the end of 2012, 3,800 public charging points were available for a total of just under 7,500 electric vehicles registered in Germany. Public charging points had been installed in more than 580 towns and municipalities across Germany
- Obtaining planning permission to install charging points in public places is often still an extremely lengthy process
- Private charging point construction is keeping pace with the increase in the number of electric vehicles and covers at least 80% of private vehicle demand
- The majority of public charging points are currently being installed in locations where public or private funding is available. The first business models are starting to emerge in these locations
- In the future, the availability of a semi-public charging infrastructure will plug a key gap in the overall infrastructure. This will be a major factor in the decision of certain user groups to buy electric vehicles

- Studies have hitherto paid insufficient attention to semi-public charging infrastructure and its user groups, compared to private and public charging facilities
- Research is ongoing into the potential grid disruption resulting from the extra grid load associated with fast charging and frequent charging at transport hubs

Working group status and required next steps:

WG3 "Charging infrastructure and power grid integration"

- The minimum technical and quantitative requirements for building a fast charging infrastructure are currently being drawn up and will be submitted to the NPE's Steering Committee at the end of 2013
- Public charging infrastructure needs are being determined for different types of urban area, taking a variety of criteria into account (e.g. what the area is used for, origin and destination of the traffic passing through the area, the number of private parking spaces and estimates of the number of semi-public parking spaces with charging facilities)
- Transport and urban planning measures involving installation of on-street charging points or charging facilities sited in other suitable locations should be subject to standardised checks
- Detailed research is being carried out into possible business models for operating a semi-public charging infrastructure. Particular effort is also being devoted to the study of models where employers provide charging facilities for their employees in company car parks
- The legal and tax law implications (e.g. the regulation of charging facilities provided by employers as non-cash benefits) are also being studied
- The liability issues connected with new types of charging facility (fast charging, streetlight-mounted charging units) are being studied and assessed



- Work is ongoing to evaluate ways of employing incentives or support to encourage businesses that are in principle interested in the field to build semi-public charging infrastructure. Particular emphasis is being placed on investigating how the construction of semi-public charging infrastructure can be incorporated into existing funding mechanisms
- The experiences with semi-public charging infrastructure in the model regions and showcase projects are being documented and evaluated

WG7 "General framework"

- Examples of relevant arrangements in development plans or agreements in urban planning contracts are being compiled and evaluated
- Work is being carried out to establish whether and to what extent planning law needs to be amended
- The WG is working with the Joint Commission of the Federal and Regional Governments (Bund-Länder-Kommission) to establish whether and to what extent building regulations need to be amended
- In order to promote the incorporation of electric mobility into privately run new-build and redevelopment projects, proposals are being submitted with regard to incentive schemes and guidelines for building contractors and housing developers, property owners and employers (e.g. as part of local authority guidelines on climate protection and the financial support schemes available through Germany's reconstruction loan corporation (Kreditanstalt für Wiederaufbau))
- Planning law requirements for the construction of private and public parking facilities with charging points are being investigated
- Building regulations are being studied with regard to the possibility of requiring a certain percentage of parking spaces to be equipped with charging facilities and the authorisation of local authority strategies

(for new developments and redevelopments)

- Possible incentives for retrofitting parking facilities with charging points (standard and fast charging) are being discussed and assessed. Initiatives for enhancing and expanding the number of electric car sharing vehicle parking facilities, e.g. in Park & Ride car parks or at LPT stations are being documented and information leaflets are being developed for local actors
- Models are being documented and developed that look at ways of enabling transport providers or local authorities to use publicly-owned land for electric mobility purposes
- German property ownership and tenancy law are being studied to see if they need to be amended or simplified with regard to the installation or retrofitting of charging points (in order to provide planning security for people buying or renting a property)

Charging Infrastructure: Open-system access to charging infrastructure with regard to connectors/mechanical components, authentication and payment systems

Responsible working groups:

- WG3 "Charging infrastructure and power grid integration",
WG4 "Regulation, standardisation and certification"

Description:

- The frequency with which vehicles need to be charged and the large number of different providers make it necessary to ensure that the system's physical components (connectors/mechanical components) and in particular authentication and payment systems are designed so that they can be easily and universally used by customers

Status:

- Standards governing connectors and mechanical components are in place and virtually every country in Europe has adopted or is intending to adopt a Type 2-based charging infrastructure standard (AC/DC, including CCS)
- From 2017 onwards, all public charging facilities will be expected to provide Type 2 connectors for AC charging. Moreover, the aim is for all public fast DC charging units to comply with the CCS standard
- Standard authentication and payment systems have yet to be established. Some of the underlying principles have been developed at the pre-normative stage and are starting to be discussed by standardisation bodies. However, there is still some way to go before universal standards are introduced
- The following authentication methods are currently in widespread use on the market: Power Line Communication (PLC), Radio-Frequency Identification (RFID), mobile-phone based methods, telephone hot-lines, debit and credit cards, pay and display machines, keys and cash payment

Two different payment methods are currently in use on the market: contract-based charging and pay-as-you-go

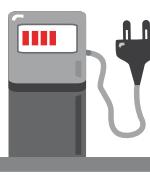
Working group status and required next steps:

WG3 "Charging infrastructure and power grid integration"

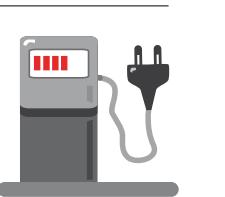
- The minimum standard for public charging stations should be a CCS-enabled Type 2-based charging infrastructure
- Efforts are being made to equip the charging infrastructure with a remote capability in order to enable charging stations to be unlocked and activated remotely
- Work is ongoing to promote the installation of the necessary IT infrastructure for charging stations in public car parks, so that information about whether or not a charging station is currently in use can be displayed on board people's vehicles or via smartphone apps
- The use of roaming-enabled systems (with common billing and authentication processes) is being tested and developed in the showcase projects

WG4 "Regulation, standardisation and certification"

- It is necessary to keep working towards the rapid, universal introduction of a Type 2-based charging infrastructure (AC/DC using CCS) throughout Europe by continuing discussions with the relevant European partners. Standardisation projects that are currently underway should be concluded as swiftly as possible
- Support is being provided where necessary for the standardisation work that is already underway in the field of authentication
- Support is being provided where necessary to help coordinate the outcomes of R&D and completed consortium-based standardisation initiatives in order to create a Europe-wide – and as far as possible worldwide – official open-system authentication standard



Charging Infrastructure: data security and data protection law questions



Responsible working groups:

WG3 "Charging infrastructure and power grid integration",
WG4 "Regulation, standardisation and certification"

Description:

- The charging infrastructure will be connected to power grids and information networks and will thus be part of a critical infrastructure that requires special protection against unauthorised access and tampering. This applies in equal measure to the private and public charging infrastructure
- Data security and data protection acquire particular importance in view of the large volumes of user- and vehicle-specific data involved in the charging process. Customers need to be confident that their data is being handled robustly and securely and that appropriate data protection standards are in place

Status:

- The current standards expand on and flesh out the existing statutory regulations and frameworks. However, the stocktaking and identification of potential concrete areas where action needs to be taken in the field of standardisation is a process that has yet to be concluded
- Current efforts are geared towards achieving a common understanding of market roles and processes

Working group status and required next steps:

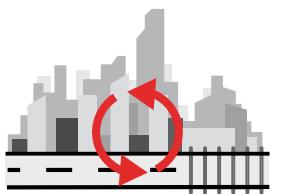
WG3 "Charging infrastructure and power grid integration"

- Work is ongoing with regard to the key aspects of electronic communication processes to ensure that they comply with legal requirements, in particular the relevant ICT security and data protection requirements. In the case of the private charging infrastructure, for example, this would relate to communication with the grid operators
- The outcomes of the showcase projects with regard to data exchange for roaming, authentication and charging and driving behaviour are being consolidated

WG4 "Regulation, standardisation and certification"

- The findings from R&D initiatives and the demonstration projects continue to be fed into the open-ended process of determining what degree of standardisation is required taking into account the specific ICT security and data protection requirements
- Standardisation initiatives are being promoted based on the needs identified over the course of this process

Urban Planning and Intermodality: Sanctions for unauthorised use of parking spaces



Responsible working group:

WG7 "General framework"

Description:

- Statutory regulations are needed in order to guarantee access to the available charging infrastructure. These regulations should also cover the parking spaces that are adjacent to charging points, which need to be kept reliably available for the time it takes to charge up vehicles' batteries or for a pre-defined period of time

Status:

- There are currently no regulations governing charging procedures and the priority use of parking spaces by electric vehicles. Consequently, there are no sanctions for vehicles that park in charging point parking spaces without using the charging facilities
- The basic requirements for regulating the use of public parking facilities in connection with electric vehicles have been established based on pilot projects and practical experience. However, no standard practices have yet been developed for designating the priority use of parking spaces for charging electric vehicles or for the sanctions to be employed in the event of infringements
- In Germany, a ministerial communiqué has been issued concerning standard signage for the use of parking spaces by electric vehicles, especially parking spaces adjacent to charging points in public places. Consequently, a basis does exist for signage of parking spaces and in particular those adjacent to charging points in public places. However, different towns and municipalities have interpreted the communiqué in different ways

Working group status and required next steps:

WG7 "General framework"

- Work is underway to investigate the extent to which road traffic regulations need to be amended in order to ensure a consistent approach to the priority use of public parking spaces by electric vehicles
- A number of proposals have been developed concerning amendments to road traffic regulations in relation to the visual identification of electric vehicles as "Electric" (vehicle type definition)
- A number of solutions are being developed in order to ensure that the current charging status (charging, fully charged) is clearly displayed. The relevant temporary alternative solutions (e.g. parking disc-style solutions) are also being developed
- Various solutions for limiting the time that charging point parking spaces can be used for are being developed, together with sanctions for the use of public parking spaces by fully charged vehicles, vehicles that are not currently being charged, or conventional vehicles

Urban Planning and Intermodality: Mobility maps

Priority areas

Responsible working groups:

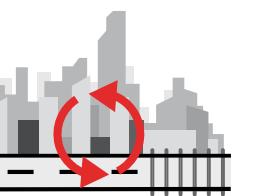
- WG3 "Charging infrastructure and power grid integration",
- WG4 "Regulation, standardisation and certification",
- WG7 "General framework"

Description:

- Intermodal mobility facilities (private cars, car sharing, LPT) are a key consideration for the environmentally-conscious customers who are most likely to be interested in using electric vehicles on a daily basis. In order to ensure trouble-free use, the relevant services will need to be enhanced and all the relevant transport modes and providers will have to be included in the process

Status:

- This issue has been addressed as part of various R&D projects that have sought to analyse commuter flows and transport requirements
- The first cross-provider demonstration projects have been launched under the auspices of the showcase initiatives and model regions
- Cross-provider payment systems are currently being tested



Working group status and required next steps:

WG3 "Charging infrastructure and power grid integration"

- Work is ongoing to develop a cross-operator mobility map
- Mobility and charging service operators are working to automate the exchange of data pertaining to the charging infrastructure and customer or vehicle identities

WG4 "Regulation, standardisation and certification"

- Where necessary, the relevant standardisation initiatives are being developed and supported based on the outcomes of R&D and demonstration projects and other sources of information
- Established systems from the transport sector are being tested in order to determine the extent to which they can be used with mobility maps

WG7 "General framework"

- Intermodal transport will require a range of amendments to existing legislation. In particular, the provisions of the Public Transport Act (Personenbeförderungsgesetz) are being examined to determine the extent to which different types of intermodal service are actually possible
- A dialogue has been initiated with local authorities in their capacity as the primary owners of public transport companies to determine the extent to which local government LPT regulations will still be able to meet the requirements of the municipal transport market going forward



Glossary

AC:

Alternating Current; → DC

BEV:

Battery Electric Vehicle

CCS:

Combined Charging System

DC:

Direct Current; → AC

DIN:

Deutsches Institut für Normung e.V.
(German Institute for Standardisation)

HEV:

Hybrid Electric Vehicle

IAA:

Internationale Automobil-Ausstellung (International Motor Show)

ICP:

Integrated Circuit Packaging

ICT:

Information and Communication Technology

IEC:

International Electrotechnical Commission

ISO:

International Organization for Standardization

Li-ion technology:

Lithium-ion technology; also lithium-ion battery, lithium-ion secondary battery

LPT:

Local Public Transport

OEM:

Original Equipment Manufacturer

PHEV:

Plug-in Hybrid Electric Vehicle

REEV:

Range Extended Electric Vehicle

RFID:

Radio-Frequency Identification

SoC:

State of Charge

TCO:

Total Cost of Ownership (a model for calculating all the costs associated with owning capital goods, e.g. running and maintenance costs, etc.)

V2G:

Vehicle to Grid

VDE:

Verband der Elektrotechnik Elektronik Informationstechnik e.V.
(Association for Electrical, Electronic & Information Technologies)

Wallbox:

Wall-mounted charging point

Arbeitsgruppen der NPE

- WG 1 - Drive technologies and vehicle integration
- WG 2 - Battery technology
- WG 3 - Charging infrastructure and power grid integration
- WG 4 - Regulation, standardisation and certification
- WG 5 - Materials and recycling
- WG 6 - Training and qualifications
- WG 7 - General framework

Imprint

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