ElektroMobilität NRW

MOVING FORWARD. WITH ELECTRICITY.

MASTER PLAN ELECTRIC MOBILITY IN NRW 2014

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Garrelt Duin,
Minister of Economic Affairs,
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Master Plan Electric Mobility in NRW 2014 – The Next Step Towards This State's Electric Mobility Future

Electric mobility has been a widely discussed topic in North Rhine-Westphalia in the past and it remains so today. The state government's declared goal is to take a leading role in all areas of electric mobility throughout Germany. NRW presented its Master Plan Electric Mobility in NRW 2009, laying the foundation for successful electric mobile action. Now it is time to take stock and to plan the next steps towards a future in which electric mobility will play a more important role.

Fortunately, a lot of action recommendations have already been successfully implemented. With financing from European and State resources, research and development projects have been productively supplemented with projects financed by the Federal Government. Right from the beginning, the Model Region Electric Mobility Rhine-Ruhr has shown that electric mobility can be applied to everyday use. Our Competence Centers for Electric Mobility NRW have helped to shape the R&D landscape. Electric mobility has emerged as an area of operations for a lot of companies and scientific institutions.

All in all, we have successfully established a basis for an electric mobility community that is increasingly growing together. We will keep working to bring electric mobility companies to North Rhine-Westphalia.

The present Master Plan Electric Mobility in NRW 2014, which we want to use as an orientation point for our electric mobility activities, proposes ways for North Rhine-Westphalia to successfully shape its future. Alongside research and development, vehicles and infrastructure increasingly need to be introduced to the market.

Concrete support is available from the State of NRW in the form of low-interest loans from NRW.BANK, which has launched a special program for companies to make it easier for them to start or expand work on electric mobility. Moreover, we want to get the general public excited about this forward-looking topic.

As we agreed in the Coalition Contract, electric mobility remains a central innovation topic for the state government. Now our job is to implement these recommendations to the greatest extent possible.

Garrelt Duin

Minister of Economic Affairs,
Energy and Industry

ELECTRIC MOBILITY –

MADE IN NRW

There are a lot of new challenges facing society in the 21st century. We are witnessing global urbanization, increasing scarcity of resources and climate changes around the world. These trends also need to be addressed with a new mobility. Electric mobility can decisively help reduce pollutant, noise and CO_2 emissions. This should be an overall system approach that combines mobility and energy as well as living and working while integrating renewable energies.

NRW has a strong foundation in research, industry and application, which can help make it an important sales market as well as an innovation and production location for electric mobility. With renowned vehicle manufacturers, a multitude of suppliers, over 80,000 people directly employed in the automotive industry and a high concentration of universities, NRW is among Europe´s leading automotive locations. NRW is also home to large and numerous municipal energy companies.

In terms of mobility, as Germany´s most urbanized region, NRW focuses on sustainability. Among other things, that means integrated mobility concepts that offer citizens an individual, adaptable mobility mix. The range includes every electric mobility option – from electrified public long-distance and local transit to commercial and municipal electric vehicles to electric bicycles. NRW takes an approach that is open to different technologies and promotes and tests various technical solutions from plug-in hybrids to fuel cells to pure electric drives. Looking towards the future, NRW will be ready for the new challenges to position itself as pioneer for electric mobility.

By Experts for Experts: Master Plan Electric Mobility in NRW 2014

As a network of experts from various state organizations and clusters, the Electric Mobility NRW Working Group (AG Elektromobilität) coordinates the electric mobility activities undertaken by the state government and these clusters and organizations.

Electric mobility is an important field of innovation and part of the NRW Coalition Contract. The Electric Mobility NRW Working Group presented NRW with a strategy in 2009. The Master Plan Electric Mobility in NRW 2014 is now available so that this strategy can be purposefully continued. The revised and newly compiled recommendations for action include general conditions, system innovation, research and development and communication as well.

Our Vision – NRW as Nationwide Pioneer for Electric Mobility

Moreover, NRW is very well positioned to play a leading role in electric mobility throughout Germany and Europe. This is where renowned research facilities at colleges and universities meet a well-developed industrial structure with innovative companies.

The overarching goal of making NRW the nationwide pioneer for electric mobility is linked to explicit state objectives:

- Safeguarding industrial competitiveness
- Increasing the industry´s share of net product
- Strengthening the innovation site
- Establishing electric mobility as an important component in a climate-friendly and resource-saving state strategy
- Equal treatment of industrial and climate policy connections with electric mobility
- Establishing electric mobility as an important component of energy transition
- Providing a model of a densely settled agglomeration area as a large-scale and wide-ranging demonstration region in Europe

COALITION FOR ELECTRIC MOBILITY

- "We will support electric mobility in NRW along the value chain and the infrastructure requirements and thus move the expansion of electric mobility and renewable energy forward together with local authorities, science and industry."
- "We want NRW to become the nationwide pioneer for electric mobility. To achieve this goal, we will expedite projects that advance industrial policy competence and an integrated understanding of public transportation in equal measure (e.g., electric busses and battery trains, electrically supported local mobility with electric bicycles and car sharing with e-cars)."
- "Apart from the previous R&D focal points (battery/electric storage, vehicles and drives, infrastructure & grids), general economic and urban planning conditions and design questions for future urban modes of transportation should also be taken into consideration."

Excerpt of the red-green state government Coalition Contract (2012)

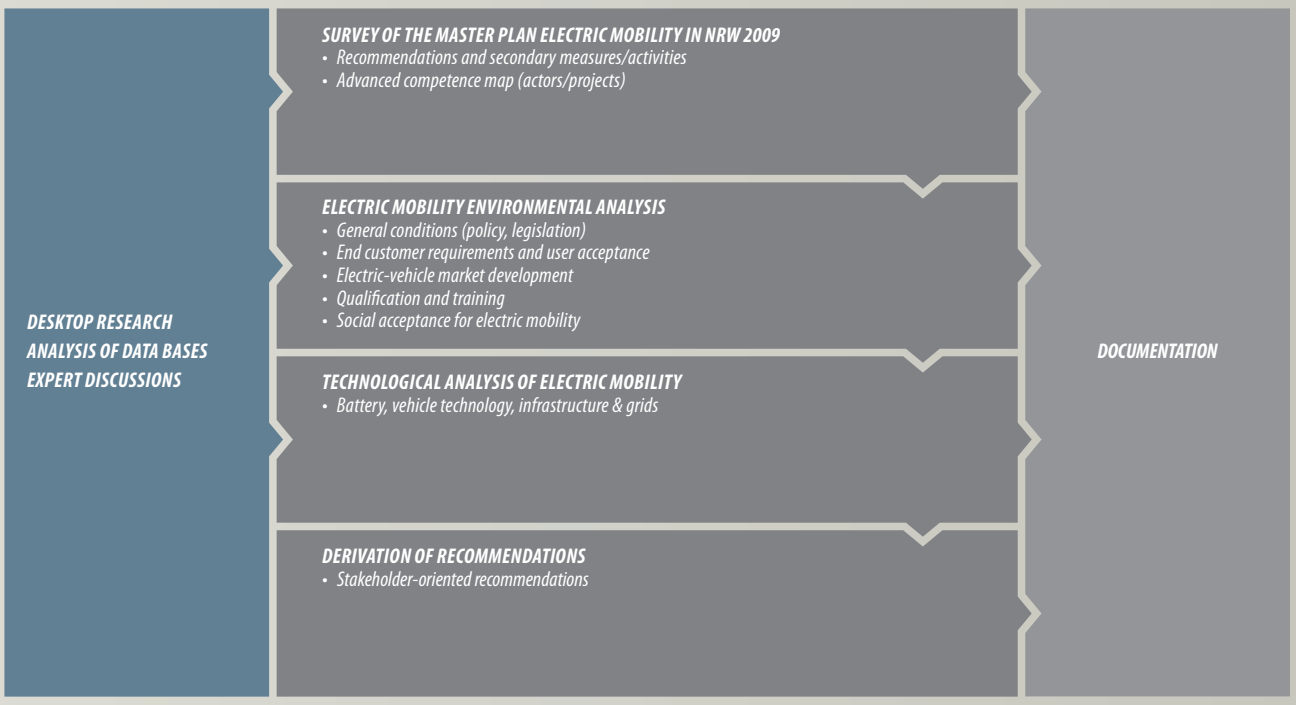


Figure 1: Methodological approach

TAKING AN SURVEY –

NRW AS ENGINE FOR INNOVATION

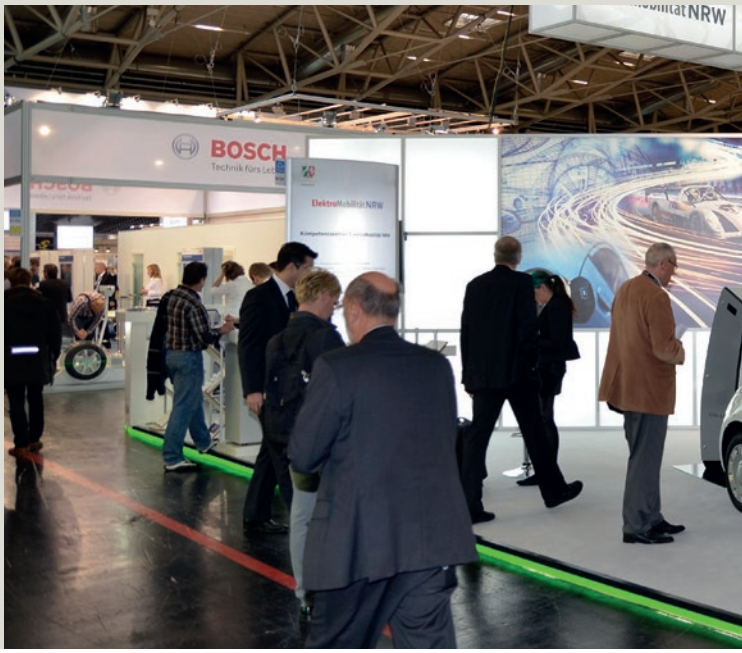
Numerous successes have been achieved since the Master Plan Electric Mobility in NRW 2009 was presented. Particularly in R&D, NRW is already a pioneer with a large number of research projects.

Research and Development – Supporting Competition, Promoting Expertise

The NRW-EU Ziel 2 program provided research projects with more than € 60 million in funding through programs like ElektroMobil.NRW and other competitions. That has created a total project volume of approximately € 115 million by 2015. The funding goes toward developing industrial policy expertise as well as an integrated understanding of passenger transportation, for example by electric busses, electrically supported local mobility with electric bicycles and car sharing with electric vehicles. It has not yet been possible to prioritize recycling chain development, an important subject for a future mass market. This should be supported with research funding in the future.

The establishment of the three "Competence Centers for Electric Mobility NRW" meant the start of the only organization of its kind in Germany – a network of R&D players. The Competence Centers for Electric Mobility NRW specialize in the three main electric mobility research focal points, namely battery, vehicle technology, infrastructure & grids and they cooperate closely with science and industry.

- Battery Competence Center for Electric Mobility NRW at the WWU Muenster. Head: Prof. Dr. Martin Winter
- Vehicle Technology Competence Center for Electric Mobility NRW at the RWTH Aachen University. Head: Univ.-Prof. Dr.-Ing. Lutz Eckstein
- Infrastructure and Grids Competence Center for Electric Mobility NRW at the TU Dortmund. Head: Univ.-Prof. Dr.-Ing. Christian Rehtanz



Sustainable Mobility – Model Region Electric Mobility Rhine-Ruhr

In terms of electric mobility, the Model Region Electric Mobility Rhine-Ruhr sponsored by the Federal Ministry for Transport and Digital Infrastructure (BMVI) already offers climate-friendly and innovative methods of resolution. With projects consolidated under these aspects, electric mobility in NRW is being tested and visibly demonstrated in practice. Fifty project partners at 25 locations were involved in the first phase between 2009 and 2011. Since the second phase began in 2012 (it will continue until 2016), eleven projects have been carried out. This phase is based on the knowledge gained in phase one. The model region projects are focused on NRW-specific issues of commercial applications/municipal fleets, local public transportation, home life and mobility (intermodality) as well as international cooperation.

Electric Mobility is Present

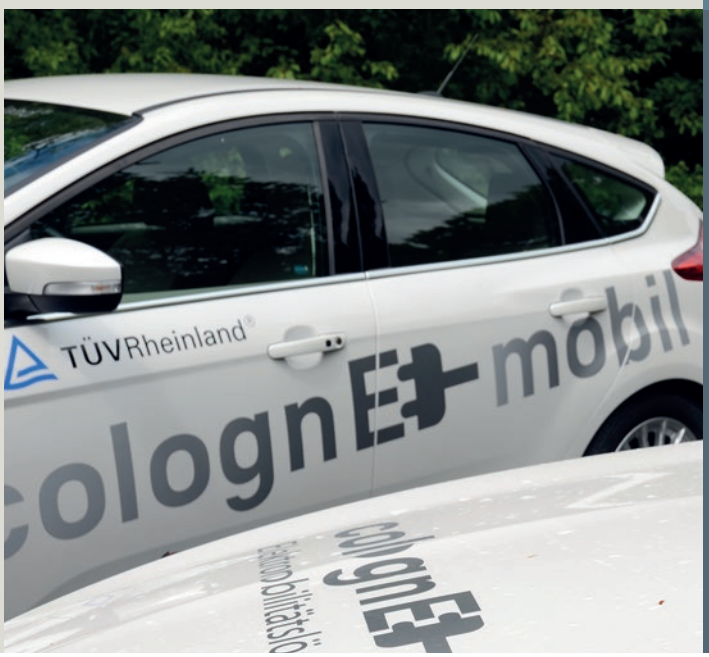
Organizing special events and participating in trade fairs are important tools for communication. Several thousand participants gained a clearer understanding of electric mobility that way. In recent years, electric mobility has also been constantly present in important media such as radio and print.

The website www.elektromobilitaet.nrw.de created a central online communication platform. Interested persons can get information on current research projects at any time by using the online project database or find project partners with the expertise atlas.

Working Internationally, Located Regionally

Location marketing campaigns implemented in target regions such as the United States, China and South Korea also serve to disseminate targeted information in important markets. The objective was and is to promote new industrial settlements and cooperation. There are still too few new OEM sites and suppliers in NRW. NRW should increase its efforts to bring new companies to NRW while also supporting existing companies.

There has not yet been sufficient production of individually selected components or entire systems in NRW either, which represent larger shares of the electric mobility value-added chain – there is still a need for action in this area as well.



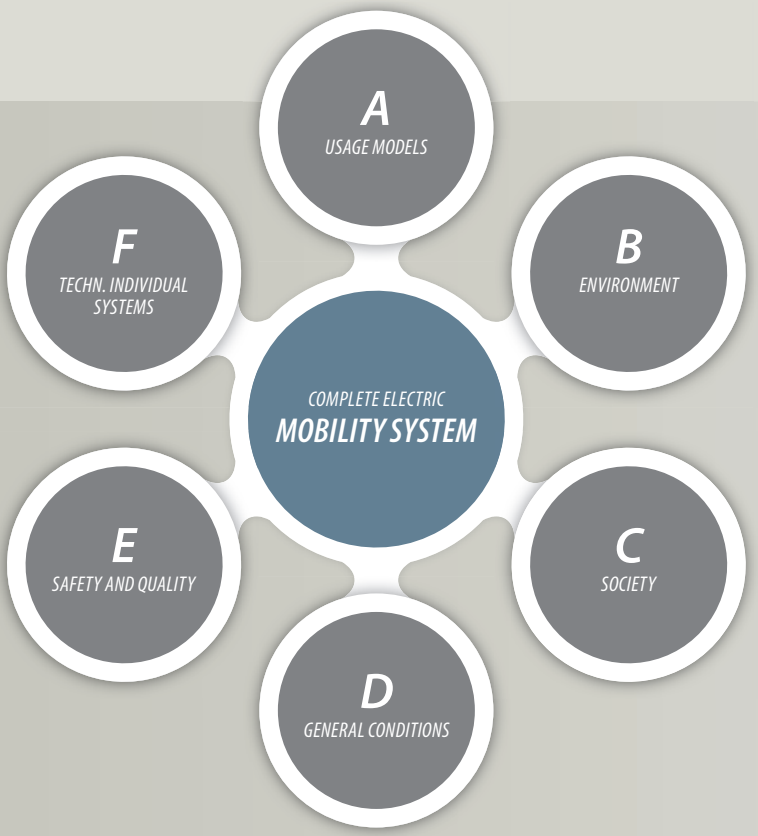
ENVIRONMENTAL ANALYSIS –

DEFINING CHALLENGES, INCREASING ACCEPTANCE

Among other parameters, the most important requirements for positive electric mobility market development are general conditions that are electric mobility-friendly. The Master Plan Electric Mobility in NRW 2014's environmental analyses investigates all factors regarding general political and legal conditions, end customer demands, market development, qualification and training and social acceptance as well.

Important findings are:

- Electric mobility-friendly general conditions are the main requirement for positive market development.
- Electric mobility should be regarded as an element of energy transition.
- The market entry is primarily through car sharing and commercial and local fleets as well.
- CO_2 reduction targets differ at federal, state and EU levels, but the trend is toward stricter regulation at all levels.
- Monetary and non-monetary incentives systems deeply influence the dissemination of electric mobility.
- Innovative mobility concepts must offer customers an individually adaptable mobility mix.
- Concerns about range and investment costs are the most significant purchasing obstacle for electric vehicles.
- Range extenders and plug-in hybrids can probably generate larger market shares over the next few years.
- Interdisciplinary and cross-sector qualification concepts must be developed. The relevant special fields must be expanded and linked in vocational and university training.
- The most important tool for increasing electric mobility's acceptance is one´s own experience.



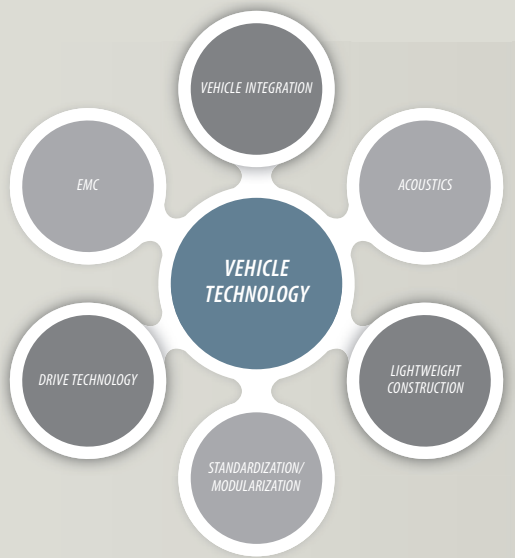
- **A** *Usage models: Fleet management, car sharing, mobility ticket, etc.*
- **B** *Environment: Production chains, CO_2 balance, noise, recycling, etc.*
- **C** *Society: Mobility concepts, Home/work-life mobility, quality of life, etc.*
- **D** *General conditions: Environmental regulations, labelling norms and standards, etc.*
- **E** *Safety and quality: Risk minimization, ease of use, sustainability, etc.*
- **F** *Technical individual systems: Vehicle, power generation, charging point, accounting, battery, etc.*

Figure 2: *Complete electric mobility system*

TECHNOLOGICAL ANALYSIS –

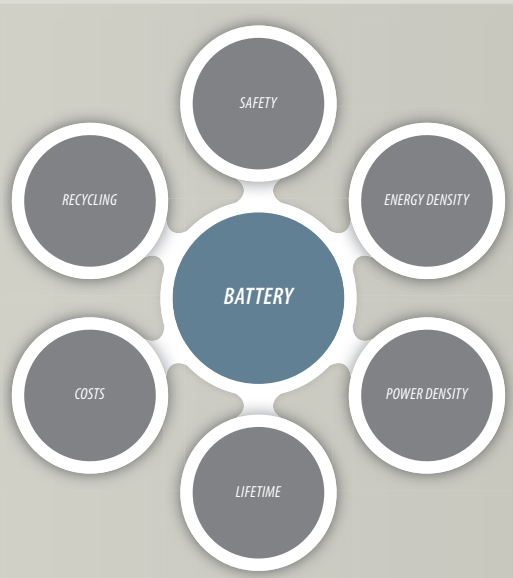
NEW TECHNOLOGY WITH NEW CHALLENGES

With numerous research and demonstration projects on central issues and a high density of private and public research institutions, NRW has positioned itself very successfully in the field of electric mobility technology. However, a broad technological analysis shows that further research and innovation is necessary because the required technology has not yet reached market maturity in every field. This systematic analysis showed for NRW that there is a need for R&D in the three defined specialty areas of battery, vehicle technology, infrastructure & grids.



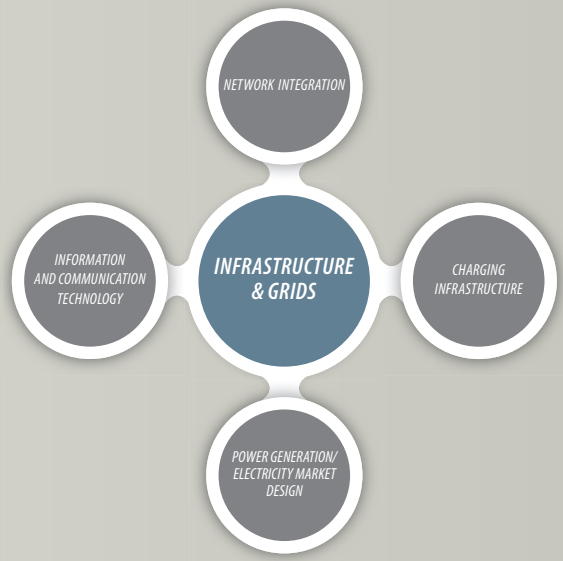
NEEDS

- *Increased range through optimized use of available energy for all applications (mileage, component and interior air conditioning)*
- *Alternative and flexible possibilities for energy supply/energy storage*
- *Functional safety for vehicles in operation and crash situations*
- *Resource-saving vehicle concepts in operation as well as during production*
- *Driving safety through automated, predictive, intelligent driving*
- *Reduction of vehicle purchase prices*



NEEDS

- *Material development and cell technology*
- *Innovative battery concepts and alternative energy storage*
- *Optimization of safety aspects*
- *Standardization of testing methodology*
- *Production research*
- *Battery system technology and recycling*
- *Battery costs*



NEEDS

- *Development and expansion of a needs-oriented, comprehensive charging infrastructure*
- *Standardized interfaces on both vehicle and network sides*
- *Needs-oriented integration of renewable energies in charging processes*
- *Integration of electric vehicles into energy market, including the mainstream energy market*
- *Unified accounting processes*

Figure 3: Results of battery, vehicle technology, infrastructure & grids technology analysis

RECOMMENDATIONS – 4 FIELDS WITH ACTION POTENTIAL

After comparing the objectives and results of the Master Plan Electric Mobility in NRW 2009 and a subsequent systematic environmental and technology analysis, four fields of action were defined: general conditions, research and development, system innovation and communication (see Fig. 4: Master Plan Electric Mobility in NRW 2014).

General Conditions – Green Light for Clean Mobility

With active participation from NRW, electric mobility-friendly conditions must be created and promoted on a national and state level. On the national level, this should be carried out through further active cooperation of the state government on designing and implementing the Electric Mobility Law. After its adoption, local actors should be supported with rapid, targeted, state-specific implementation.

During the market ramp-up phase, short-term, targeted, monetary incentives to buy an electric vehicle should be considered. The program NRW.BANK.Elektromobilität, with its low-interest loans for investments, should be continued.

To promote this important innovation topic further and to solidify NRW as a nationwide innovation location, electric mobility should be established as an integral component of the upcoming Leading Market Competition Funding Program. NRW should continue to strongly support R&D and to work on ensuring that electric mobility is regarded as a crosscutting issue in five of the eight leading markets, namely: mobility and logistics, energy and environmental economics, ICT, production and new materials.

A battery-operated electric drive only will be emissions-free when the electricity it needs comes from renewable energy sources. Therefore, electric mobility must always be thought of alongside renewable energy and be taken into consideration in new energy and electricity market design.

In the labor market, planning and implementing new university and commercial education and training programs is indispensable along the entire value chain.

Research and Development – Lighter Weight, Wider Range, Connection

NRW should continue to actively support R&D in battery, vehicle technology, infrastructure & grids.

For battery, the authors recommend promoting projects along the entire development chain. Among other things, the lithium ion battery development with regard to energy, cost, safety and durability should continue on the material, cell and system levels.

Research on post-lithium technology and innovative battery concepts is essential for reaching significant higher energy and/or power densities and lower costs. Following up on existing, productive approaches and making batteries a focal point in planned leading market funding concerning energy and environmental economics are recommended.

For sustainable electric mobility, further battery utilization after mobile application is critically important. Development and optimization of reuse or, if that is no longer possible, of recycling systems offers a wide range of innovation potential.

As electric mobility becomes a mass market, second life concepts will become increasingly important in the coming years. This means an opportunity for actors in NRW to investigate aging and safety and to develop intelligent application concepts.

Overall, NRW, with its well-developed scientific infrastructure in battery research, is in a very good starting position for R&D. In the future, it will be important to develop marketable products and successfully launch them in order to promote regional companies and create new jobs in NRW.

The high density of automotive suppliers, research institutions and other innovative medium-sized companies in NRW offers favorable conditions to take on technological leadership in the electric mobility-specific research areas of automotive technology.

Likewise, particular attention should be paid to optimizing electric drive technology and alternative drive train topologies and to intensive research in energy and thermal management. Lightweight-optimized vehicle concepts and optimum utilization of resources on all vehicle levels also need to be developed further through multi-material design, new materials and corresponding innovative production technologies.

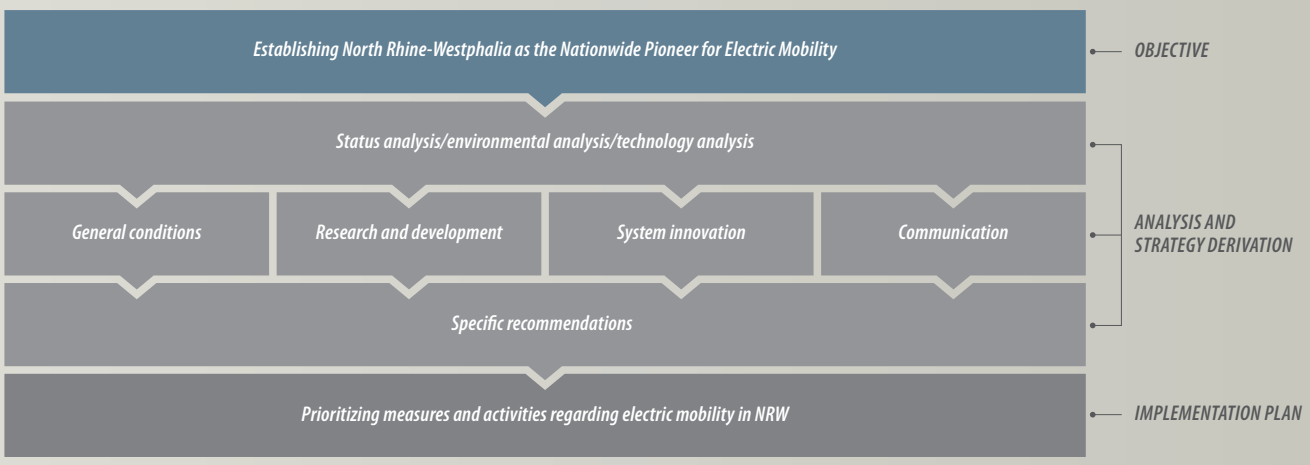


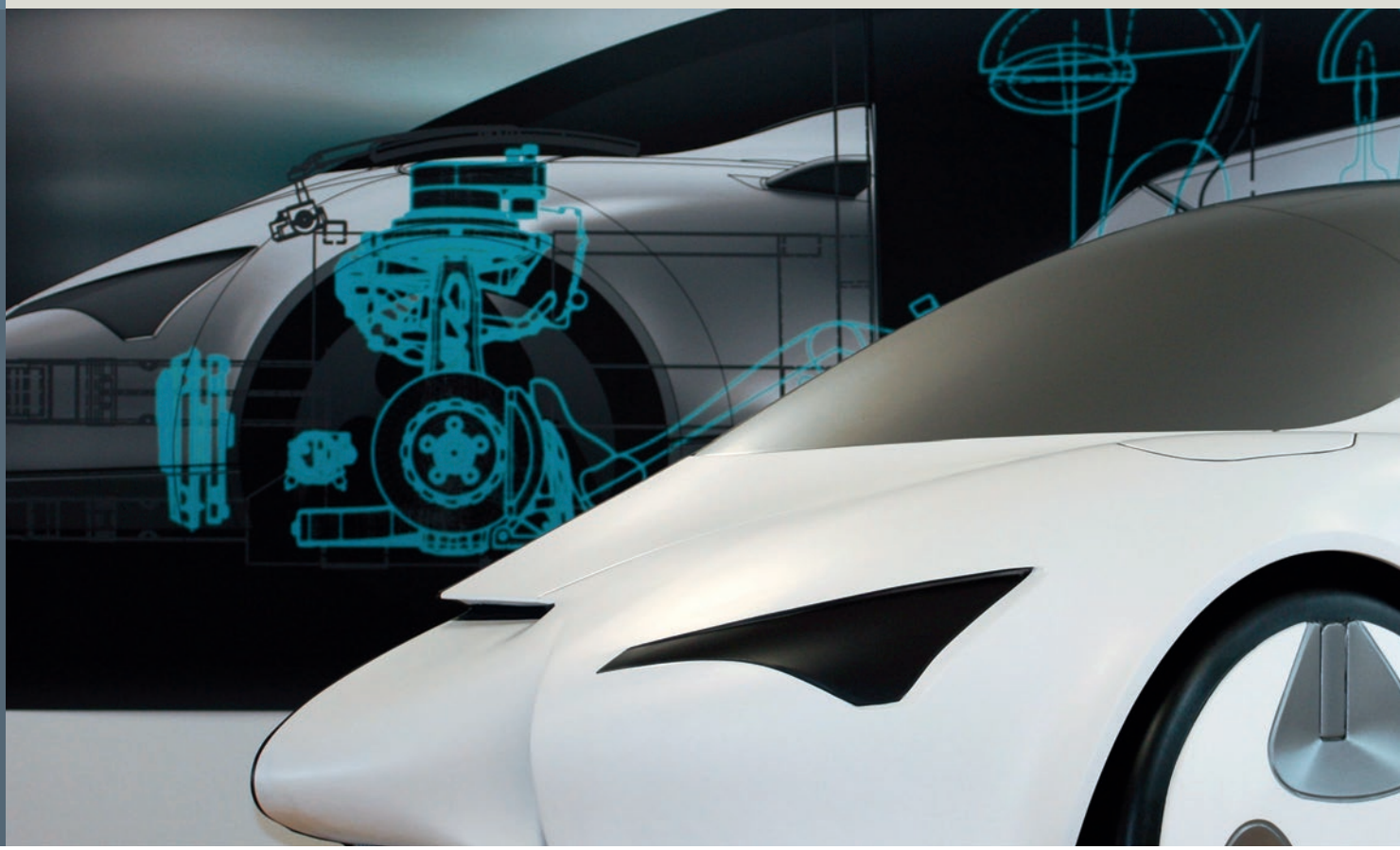
Figure 4: *Master Plan Electric Mobility in NRW 2014*

Besides drive technology and lightweight design, information and communication technology (ICT) also offers numerous opportunities. In the future, intelligent vehicles must closely interact with other vehicles (Car2Car) and with an infrastructure that will be increasingly controlled by ICT (Car2X). But reasonable use of internet and mobile terminals within the vehicle will also be highly relevant. As a result of this connection, more information will be available, safety will increase, accident frequency will decrease and traffic flow will improve. Another advantage will be information about public charging point availability and equipment.

The authors recommend continuous development and expansion of a need-oriented, freely accessible, public and semi-public charging infrastructure in NRW so that every vehicle owner can recharge at any time as needed. It will therefore be absolutely necessary to integrate the charging infrastructure, additional decentralized storage systems and renewable energy producers into the electrical supply networks.

The "Smart Grid" emphasizes intelligent networking of electric vehicles (smart cars) with the energy supply system. The objective is to charge vehicles in a way that is network compatible and to exploit renewable energy potential. To reach this objective, controlled charging and energy recovery concepts as well as uniform access to the charging infrastructure must be examined and developed. Among other things, intelligent accounting systems such as roaming concepts and business models on that basis also need to be developed. In addition to economic aspects, personal data protection should be prioritized.

However, battery, vehicle technology, infrastructure & grids should not be seen in isolation – there are a few overarching issues that need to be addressed.



As a result of initially low quantities, economies of scale, for example, are still too small and represent a complex challenge for production and development. NRW should take advantage of what is already a very good starting position to play a leading role in developing practical and integrative production processes for large-scale mass production of electric vehicles, components and batteries.

In order to successfully and safely promote component development and production in NRW, action is particularly necessary in the field of norms and standards for components and systems and in test procedure development. The state government should support the relevant committee members in North Rhine-Westphalia to move targeted, quick development of norms and standards forward.

In order to work through these action areas in a targeted and systematic way and to further strengthen R&D's strong position of in NRW, a relevant research infrastructure will have to be continuously expanded.

System Innovation – NRW as an Exemplary Model for Networking

System innovation includes the systemic observation of all transport carriers and integration of electric mobility into a holistic energy and electricity market design in consideration of decentralized provision of renewable energy. Overall electric mobility testing in NRW includes system innovation in different application areas.

The intention is to further strengthen the NRW model region, where systemic innovation is already pursued on a large scale. The following subject areas and project approaches are in focus:

- Commercial and municipal fleet use
- Electric mobility in local mass transportation
- Intermodal transport solutions
- International cooperation and collaboration

For an overall analysis of electric mobility, new technologies such as Car2X applications and integration of new vehicle types should be included in the Model Region Electric Mobility Rhine-Ruhr to a greater extent. Another essential aspect is intensification of regional and trans-regional networking. In connection with this, transit and commuter traffic are to be integrated into the testing.

To expand on the topics that have been mentioned, intensified networking of existing and planned projects is recommended to create a large-scale NRW demonstration region. Among other things, commercial fleets and private initiatives should be integrated to a greater extent.

Public authorities play an important role in testing and demonstrating electric mobility. Among other things, it is essential to develop concepts for climate-neutral administration at state and community levels. Critical points in this process are electric vehicles in municipal fleets and the use of electricity from renewable energies. The state government and communities should act as role models in this regard.

In the present market ramp-up phase, which must be effectively organized, the development and establishment of innovative and sustainable business models is also critically important.

Proven and established approaches of exchanging experiences among actors in NRW should be expanded. These exchanges are the basis for supporting the development of company-based fleet solutions or communication or public relations. Car sharing and additional leasing models can be further developed and implemented through closer collaboration.

Communication – Understanding at all Levels

Communication is a decisive aspect in several respects: It will generate broad acceptance of electric mobility among the general public, provide networking support for specialists and play an important advisory role at the political level.

Relevant specialist conferences, fairs and specialist workshops should absolutely be continued. They provide a platform for communicating results and issues arising from research and demonstration projects and promote exchange among the people involved. Another aspect is communicative integration and support of private initiatives.

Trans-regional publications and any type of communication channels should be used in the future as well to bring the idea of electric mobility to specialists, policy-makers and the public.

Events where citizens can experience electric mobility, for example driving events or civic occasions are important for increasing public acceptance. Generally understandable information about technology, financing opportunities and vehicle models that are available will ensure greater transparency. The authors recommend implementation of an "Electric Mobility in NRW" image campaign for support.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IMPLEMENTATION PLAN – ELECTRIC MOBILITY ON THE ROAD

An overall goal for NRW is to play a pioneering role in electric mobility nationwide. Important recommendations for the areas described in the previous chapter are prioritized and chronologically arranged for NRW in the implementation plan below (see Figure 5: Implementation Plan).

General Conditions

The state government's most important task is to create electric mobility-friendly conditions. The authors recommend that the state government continue playing an active role in designing and implementing the Electric Mobility Law, thereby introducing NRW-specific requirements. Besides the general regulatory conditions, short- to medium-term incentives should be established at the federal level to help electric mobility develop into a mass market. Monetary incentives such as special amortizations for fleets are conceivable, however not as a long-term measure but rather one that is time-limited to the market ramp-up phase.

A well-developed charging infrastructure is another important condition for electric mobility in NRW. Besides the private and commercial charging infrastructure, an adequate public and semi-public charging infrastructure must also be developed, preferably as a quick-charging possibility. New user groups such as commuters can only be reached by spatially integrating charging stations in a way that makes sense in terms of traffic, for example at nodal points. For targeted implementation, it is recommended that a development plan for a charging infrastructure in NRW be worked out in coordination with the federal project as part of the EUCPT- guideline (Clean Power for Transport) rollout.

Cost cutting through economies of scale and particularly through a high degree of compatibility among various components will be decisive for developing an electric mobility mass market; this urgently requires reliable standards and norms. The state government should support the figures in NRW who are involved in standardization committees. Special offers for the exchange of information should be further intensified, for instance special events and workshops.

Given its border location, NRW is particularly predestined for overarching cooperation with the Netherlands and Belgium. Moreover, additional international cooperation should be expanded and intensified. One example is the

Internationalization Wuhan/ Model Region Electric Mobility Rhine-Ruhr Project, a collaboration with China. The United States and South Korea are other examples of target regions. Through appropriate location marketing, NRW should continue to position itself as a settlement location and products made in NRW should be promoted worldwide. In addition, the authors recommend that NRW actors strongly integrate themselves into national collaborations. State organizations and clusters dealing with electric mobility in particular should continue to work closely with federal ministries and the representatives of other German states that are active in electric mobility.

Research and Development

In the research and development field, NRW is well positioned and successful within Germany. The technological analysis, however, shows outstanding issues. The North Rhine-Westphalia approach, developing coordinated solutions in three Competence Centers for Electric Mobility NRW, has become established. This approach should be pursued to network actors in their respective fields even more closely and to avoid redundancy.

The authors of the master plan advise the state government to consider the important innovation field of electric mobility in five of eight leading market areas: mobility and logistics, energy and environmental economics, ICT, production and new materials. Furthermore, actors should intensively pursue other funding access points such as federal programs.

In recent years, a series of institutions researching battery, vehicle technology, infrastructure & grids has been nurtured and established. To further strengthen that positive development, the authors encourage further expansion of the corresponding research infrastructure. Specific strengths should also be spatially focused in the future.

	CORE TASKS	UNTIL 2017	UNTIL 2020	AFTER 2020
GENERAL CONDITIONS	• Creation of electric mobility-friendly regulatory general conditions • Development of an adequate charging infrastructure	Implementation of Electric Mobility Law 1 + 2 in a state-specific manner		
		Consistent and coordinated economic measures on EU, federal, state and local levels		
		Deepening national and international cooperation		
		Strengthening NRW's involvement in standardization committees		
		Creation of an infrastructure development plan		
		Development of adequate public infrastructure		
RESEARCH AND DEVELOPMENT	• Strengthening NRW as an electric mobility innovation location	Promotion of electric mobility in leading markets		
		Expansion of Competence Centers for Electric Mobility NRW		
		Expansion of relevant research infrastructure		
SYSTEM INNOVATION	• Increase number of electric vehicles (NRW goal: 250,000 vehicles by 2020) • Demonstrate complete electric mobility system	10 % electric vehicles in the state fleet		
		Strengthen Model Region Rhine-Ruhr		
			Creation of NRW demonstration region	
		Targeted use of monetary incentives, e. g., continuation of the NRW.Bank Elektromobilität program		
		Expansion of the electric mobility settlement campaign		
COMMUNICATION	• Increasing acceptance among end users • Networking between NRW actors	Launching an integrated image campaign that includes ecological considerations		
		Continuation of established special events		
		Expansion of central information platform elektromobilitaet.nrw.de		

Figure 5: Implementation plan

System Innovation and Market

NRW must continue to demonstrate electric mobility as a complete system and the Model Region Electric Mobility Rhine-Ruhr must be strengthened to that end. In the medium to long term, expansion to a large-scale demonstration region by integrating additional existing or new projects and initiatives is recommended. Topics such as commuter traffic, tourism and rural areas can thereby be examined.

We are currently in the market ramp-up phase. In the short and medium term, the number of vehicles in NRW should be increased significantly. State and municipal governments should play a leading role in this. Similar to the federal government's commitment, the objective should be to integrate electric vehicles to at least a 10 % share of the state fleet. Municipal and private fleet operators should be supported as early adopters to increase their share of electric vehicles.

The location marketing campaigns that were previously recommended in the Master Plan Electric Mobility in NRW 2009 should be advanced in a concentrated manner for the purpose of not only settling new companies in NRW but also strengthening the existing regional economy and particularly establishing component development and production in NRW in the market ramp-up phase. Existing concepts should thus be scrutinized and, where necessary, revised for more successful location marketing.

Communication

Electric Mobility NRW Working Group´s communication measures are intended to increase acceptance among end consumers, further network Westphalia's specialists and offer advisory policy support. To effectively fulfill all these tasks, the authors recommend developing a holistic image campaign in consideration of the interplay between ecology and economy. The campaign must endeavor to continue positive approaches such as civic occasions and special events and thereby to communicate the positive aspects of electric mobility and set the mood for electric mobility.

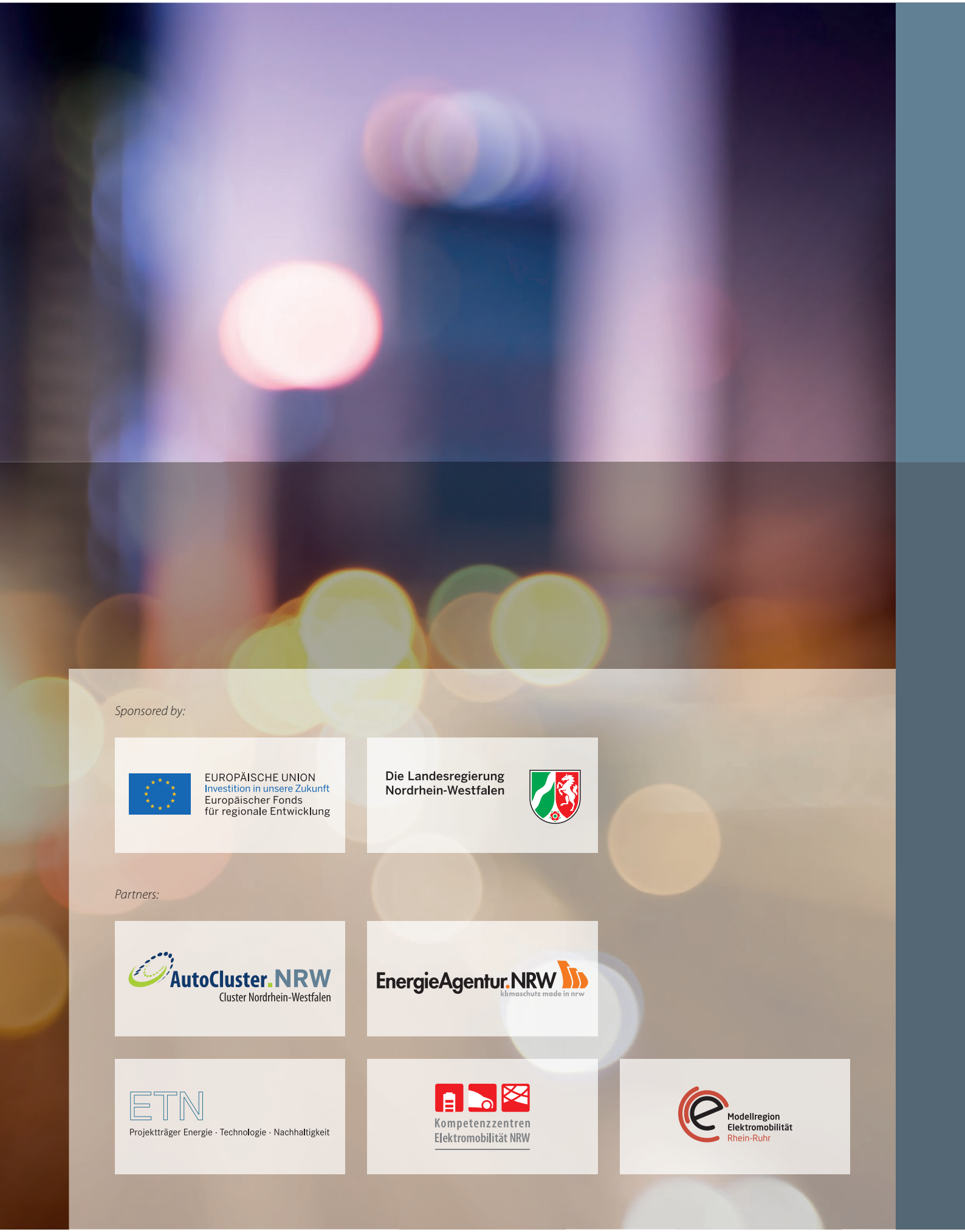
Established specialist symposiums, fairs and specialized workshops should be continued to further strengthen cooperation and networking in NRW.

Further expansion of the www.elektromobilitaet.nrw.de central information platform is relevant for all actors and interested people. Besides the information already available such as event notices, the project database and the expertise atlas, an infrastructure map should be developed. That way different stakeholders can be provided specific information.

Pointed in the Right Direction

The Master Plan Electric Mobility in NRW 2014 is a consistent development of the state strategy after the Master Plan Electric Mobility in NRW 2009. Starting from the status quo, a comprehensive strategy was developed using environmental and technological analyses and recommendations were compiled in the four action areas: general conditions, system innovation, R&D and infrastructure and networks.

NRW has aims to become the national pioneer for electric mobility. The Master Plan Electric Mobility in NRW 2014 should serve as guide for continuing electric mobility's positive development in NRW.



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Nordrhein-Westfalen

Partners:

AutoCluster.NRW
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Projektträger Energie · Technologie · Nachhaltigkeit

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Elektromobilität NRW

Modellregion
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